U.S. Department of Energy
Office of River Protection
P.O. Box 450
Richland, Washington 99352

0058973

FEB 2 0 2003

03-ED-031

Mr. Jerry Leitch, Chief
Radiation and Indoor Air Section
U.S. Environmental Protection Agency
Region 10
1200 Sixth Avenue
Seattle, Washington 98101

Dear Mr. Leitch:

TRANSMITTAL OF THE 241-C-104 RETRIEVAL RADIOACTIVE AIR EMISSIONS NOTICE OF CONSTRUCTION (NOC) APPLICATION AND THE SUPPORTING HANFORD SITE AIR OPERATING PERMIT (AOP) NOTIFICATION OF OFF-PERMIT CHANGE REQUEST

Attachment 1 to this letter contains the 241-C-104 radioactive air emissions NOC application. Attachment 2 is the Hanford Site Title V AOP "Notification of Off-Permit Change Request" form for the 241-C-104 NOC application.

The U.S. Department of Energy, Office of River Protection requests the State of Washington Department of Health process the 241-C-104 radioactive air emissions NOC application as described in Washington Administrative Code (WAC) 246-247-060 and the State of Washington Department of Ecology, consistent with its role as the permitting authority, process the "Notification of Off-Permit Change Request" as described in WAC 173-401-724.

If you have any questions, please contact Dennis W. Bowser, Environmental Division, (509) 373-2566.

Sincerely,

James E. Rasmussen

James E. Rasmussen, Director
Environmental Division

ED:DWB

Attachments: (2)

cc w/o attachs:
Administrative Record (w/attachs)
Environmental Portal, LMSI
WDOH Richland Office

Attachment 1
03-ED-031

241-C-104 Radioactive Air Emissions Notice of Construction Application

CONTENTS

APPENDICES

FIGURES

TABLES

TERMS

ALARACT	as low as reasonably achievable control technology
ANSI	American National Standards Institute
APQ	Annual Possession Quantity
ASME	American Society of Mechanical Engineers
BARCT	best available radionuclide control technology
CFR	Code of Federal Regulations
Ci	curie
HEPA	high-efficiency particulate air
MEI	maximally exposed individual
MPR	maximum public receptor
NOC	notice of construction
SEPA	*State Environmental Policy Act of 1971*
TEDE	total effective dose equivalent
WAC	*Washington Administrative Code*
WDOH	Washington State Department of Health

Table 1. Metric Conversion Chart.

Into metric units			Out of metric units		
If you know	Multiply by	To get	If you know	Multiply by	To get
Length			**Length**		
inches	25.40	Millimeters	millimeters	0.0393	inches
inches	2.54	Centimeters	centimeters	0.393	inches
feet	0.3048	Meters	meters	3.2808	feet
yards	0.914	Meters	meters	1.09	yards
miles	1.609	Kilometers	kilometers	0.62	miles
Area			**Area**		
square inches	6.4516	square centimeters	square centimeters	0.155	square inches
square feet	0.092	square meters	square meters	10.7639	square feet
square yards	0.836	square meters	square meters	1.20	square yards
square miles	2.59	square kilometers	square kilometers	0.39	square miles
acres	0.404	Hectares	hectares	2.471	acres
Mass (weight)			**Mass (weight)**		
ounces	28.35	Grams	grams	0.0352	ounces
pounds	0.453	Kilograms	kilograms	2.2046	pounds
short ton	0.907	metric ton	metric ton	1.10	short ton
Volume			**Volume**		
fluid ounces	29.57	Milliliters	milliliters	0.03	fluid ounces
quarts	0.95	Liters	liters	1.057	quarts
gallons	3.79	Liters	liters	0.26	gallons
cubic feet	0.03	cubic meters	cubic meters	35.3147	cubic feet
cubic yards	0.76456	cubic meters	cubic meters	1.308	cubic yards
Temperature			**Temperature**		
Fahrenheit	subtract 32 then multiply by 5/9ths	Celsius	Celsius	multiply by 9/5ths, then add 32	Fahrenheit
Force			**Force**		
pounds per square inch	6.895	Kilopascals	kilopascals	1.4504×10^{-4}	pounds per square inch

Source: *Engineering Unit Conversions*, M. R. Lindeburg, PE., Second Ed., 1990, Professional Publications, Inc., Belmont, California.

INTRODUCTION

This document serves as a notice of construction (NOC) application, in accordance with Washington Administrative Code (WAC) 246-247-060, and as a request for approval, in accordance with 40 Code of Federal Regulations (CFR) 61.07, for the installation and operation of a waste retrieval system in Single Shell Tank (SST) 241-C-104. The retrieval system will utilize a pneumatic arm to "vacuum" waste sludges and interstitial liquids out of the tank and pump them, using double contained over ground transfer lines, to Double Shell Tank (DST) 241-AY-101. Another feature of the retrieval system to be used in 241-C-104 is a small in-tank vehicle or robotic crawler that will be inserted through a riser to move waste sludges and interstitial liquids from the outer portions of the tank to the centrally located pneumatic arm.

The total effective dose equivalent (TEDE) from all calendar year 2001 Hanford Site air emissions (point sources as well as diffuse and fugitive sources) was 0.49 millirem (DOE/RL-2002-20). The emissions resulting from the activities covered by this NOC application, in conjunction with other operations on the Hanford Site, will not exceed the National Emission Standard of 10 millirem per year (40 CFR 61, Subpart H). The potential unabated emissions from all activities associated with the 241-C-104 retrieval project are estimated to result in an estimated TEDE to the hypothetical offsite maximally exposed individual of approximately 223 millirem per year. Abated emissions are estimated to result in a TEDE to the hypothetical offsite maximally exposed individual of 0.294 millirem per year. Activities that contribute to this dose include pit entries, equipment removal, excavation work, and active and passive ventilation during retrieval operations. This dose estimate is conservative for purposes of bounding project activities. The duration of project activities is expected to be less that three years and the earliest start of construction could be summer of 2003.

This application also provides notification of anticipated initial start-up, in accordance with 40 CFR 61.09(a)(1). It is requested that approval of this application will also constitute Environmental Protection Agency (EPA) acceptance of the initial start-up notification. Written notification of the actual date of initial start-up, in accordance with 40 CFR 61.09(a)(2), will be provided at a later date.

1.0 FACILITY NAME AND LOCATION

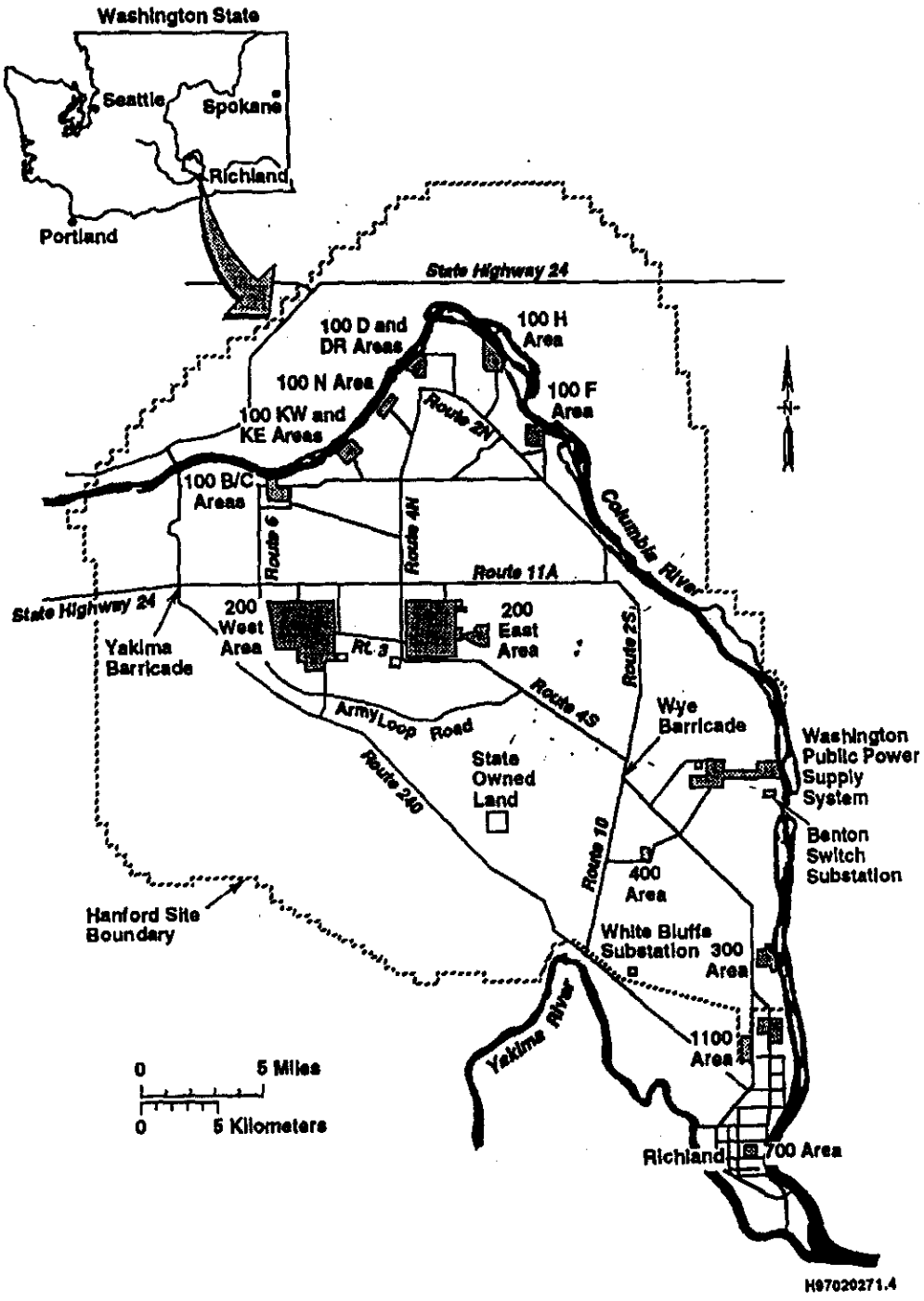
Regulatory Citation: "Name and address of the facility, location (latitude and longitude) of the emission unit(s)."

The 241-C Tank Farm is located at the:
U.S. Department of Energy, Office of River Protection
Hanford Site,
200 East Area Tank Farms
Richland, Washington 99352

The C Tank Farm is due north of the PUREX Plant in the 200 East Area (see Figure 1) at the corner of Canton Avenue and Seventh Street. The proposed exhauster is a saltwell exhauster previously approved by WDOH for use on similar tank farm activities.

The Geodetic coordinates of 241-C-104 tank are:
Latitude: 46* 33' 28.6"
Longitude: 119* 31' 5.8".

Figure 1. Hanford Site.



2.0 RESPONSIBLE MANAGER

Regulatory Citation: "Name, title, address, and phone number of responsible manager."

The responsible facility manager is:
Roy J. Schepens, Manager
U.S. Department of Energy, Office of River Protection
P.O. Box 450, MSIN H6-60
Richland, Washington 99352
(509) 376-6677

3.0 PROPOSED ACTION

Regulatory Citation: "Identify the type of proposed action for which this application is submitted:
a. Construction of new emission unit(s);
b. Modification of existing emission unit(s); identify whether this is a significant modification – significant means the potential-to-emit airborne radioactivity at a rate that could increase the TEDE to the MEI by at least 1.0 mrem/yr as a result of the proposed modification; Modification of existing unit(s), unregistered."

This application is submitted in accordance with WAC 246-247-060(1)(a) as a new Notice of Construction application for the retrieval of radioactive mixed wastes from Tank 241-C-104 at the Hanford Site in the Sate of Washington.

The proposed action will be to perform the following steps to retrieve or directly support the retrieval of wastes from Tank 241-C-104. Where previously agreed upon controls identified in As Low As Reasonably Achievable Control Technology (ALARACT) demonstrations apply, the ALARACT number(s) are provided. The steps listed below may not necessarily be performed in this order:

Step 1
- Remove pump from riser R13 in heel pit 04B (using ALARACTs 1, 4, 6, 13, 14, and 15)
- Fix any contamination and remove debris, blown in soil, etc. from heel pit 04B (using ALARACTs 4, 6, and 14)
- Install articulating mast system into 241-C-104 through riser R13 in heel pit 04B (using ALARACTs 1, 4, 6, 13, and 14)
- Close heel pit 04B and seal necessary penetrations for hydraulic, water, and transfer lines (using ALARACTs 4, 6, and 14)

Step 2
- Remove sludge pump from riser R9 in pump pit 04A (using ALARACTs 1, 4, 6, 13, 14, and 15)
- Remove pump from riser R6 in pump pit 04A (using ALARACTs 1, 4, 6, 13, 14, and 15)

- Fix any contamination and remove debris, blown in soil, etc., from pump pit 04A (using ALARACTs 4, 6, and 14)
- Install inlet HEPA filter using riser R6 as the air pathway to the vapor space of 241-C-104 (using ALARACTs 1, 4, and 13)
- Install passively HEPA filtered umbilical enclosure and contact maintenance room on top of pump pit 04A (using ALARACT 6)
- Install umbilical management system, crawler, and crawler decontamination system into umbilical enclosure
- Seal penetrations for hydraulic lines in the umbilical enclosure

Step 3
- Install camera assemblies (with ~1.5 cfm air purge capabilities to keep lenses clear) in risers R3, R5, and R15 (using ALARACTs 1, 5, and 13)
- Remove existing Enraf from riser R8 and install stilling well equipment (using ALARACTs 1, 5, and 15)
- Remove existing breather filter, place portable exhauster (POR-008) on or near 241-C-104, and connect ducting to riser R2 (using ALARACTs 1, 4, 5, 15, and 16)

Step 4
- Place hydraulic power pack; and passively HEPA filtered vessel, vacuum, and pump skids on or near 241-C-104
- Connect hydraulic lines between hydraulic power pack, upper module on top of pit 04A, articulating mast system, etc.
- Connect over ground transfer (OGT) lines to vessel skid, pump skid, and 241-AY-01A pit (using ALARACTs 1, 4, 5, 6, 12, and 14)
- Run and connect air, water, hydraulic, and electrical lines for hydraulic power pack, vessel skid, umbilical enclosure, pump skid, portable exhauster, in-tank cameras, control instrumentation, etc. (using ALARACT 5)

Step 5
- Retrieve wastes from 241-C-104 using the articulating mast system to "vacuum" wastes into the vessel skid
- Use the mobile retrieval system (crawler) to push, or possibly jet, sludges near the center of the tank where they can be reached by the articulating mast system for removal
- Use the water nozzle on the mobile retrieval system (crawler) to selectively wash the tank walls, move/breakup waste agglomerations, and/or wash wastes to the center of the tank for removal

Step 6
- Pump wastes from the vessel skid to 241-AY-101 using over ground transfer lines (OGTs) (using ALARACT 11)
- Remove some or all of the in-tank and support equipment for maintenance, repair, disposal or re-use for future tank retrievals (using ALARACTs 1, 5, 6, 13, 14, 15, and 16)

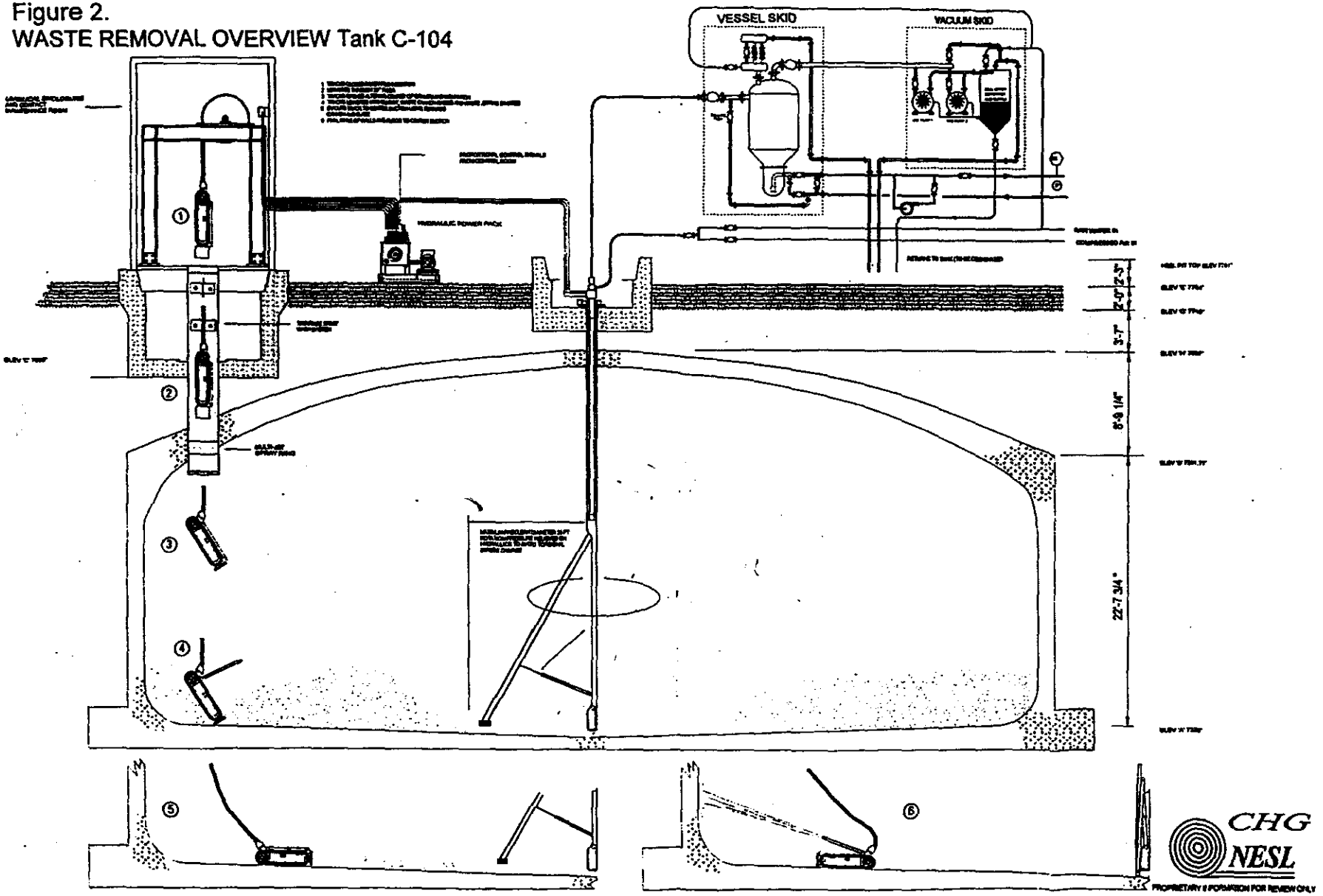
NOTE: If necessary, controls contained in other ALARACT demonstrations may be used to reduce the potential emissions while performing 241-C-104 retrieval activities.

4.0 STATE ENVIRONMENTAL POLICY ACT OF 1971

Regulatory Citation: "If the project is subject to the requirements of the State Environmental Policy Act (SEPA) contained in Chapter 197-11 WAC, provide the name of the lead agency, lead agency contact person, and their phone number."

The proposed action is categorically exempt from the requirements of the State Environmental Policy Act under WAC 197-11-845. The Tank Waste Retrieval System (TWRS) Environmental Impact Statement (EIS) covers this retrieval project.

Figure 2.
WASTE REMOVAL OVERVIEW Tank C-104



CHG NESL

5.0 CHEMICAL AND PHYSICAL PROCESSES

Regulatory Citation: "Describe the chemical and physical processes upstream of the emission unit(s)."

The 241-C-104 tank is a sound 530,000-gallon single shell tank that was interim stabilized (free liquids removed to reduce leak potential and volume) in 1989. The concrete tank is 75 feet in diameter, approximately 30 feet high, and the walls and bottom of the tank have a steel liner to contain radioactive mixed wastes. The tank has approximately 259,000 gallons of sludge (which contains about 29,000 gallons of interstitial liquid) and does not contain any salt cake. For calculation purposes, the total volume of the remaining sludge and interstitial liquids was used to estimate emissions based on the tank volume (259,000 gallons) as reported in HNF-EP-0182, Rev. 169, *Waste Tank Summary Report for Month Ending September 30, 2002.*

The method for retrieving wastes at 241-C-104 is designed to minimize the use of added water to reduce the potential liquid volume if a tank leak occurred during retrieval. While this will be the first use of this system in a Hanford tank, the articulating mast unit is used to clean sludges from the holds of oil tankers and has proven to be very reliable in harsh environments. Robotic crawlers similar to the one to be used at 241-C-104 have been in use since the mid-1980's to clean out oil sludges, compressed oil deposits, and chemical tanks. The articulating mast unit (equipped with an end effector to optimize retrieval efficiency) and the robotic crawler are being intensively tested at the Cold Test Facility to ensure that all components can operate efficiently and effectively to retrieve tank wastes.

The waste retrieval process to be used in 241-C-104 can generally be summarized as follows:

Stage 1—Following installation of all in-tank equipment and above ground support equipment (See Section 3.0), the vacuum pumps in the vacuum skid will be started. The resulting vacuum will be directed through the articulating mast system near the center of the tank to the end effector, which is in contact with the tank waste. Due to the design of the end effector, the pneumatically assisted vacuum retrieval system will draw the waste up through the approximately three inch vacuum pipe to the waste vessel in the vessel skid in batches of up to 800 gallons. Varying amounts of air (up to 20 cfm) and water are introduced into this unit to enhance waste removal and to reduce plugging of the vacuum pipe. The articulating mast system is then valved out while the waste vessel is emptied and pumped out through the over ground transfer lines to 241-AY-101. When the waste vessel is nearly empty, the transfer line will then be valved out and the articulating mast system will be valved back in and another batch of up to 800 gallons of waste will be removed from the tank. This process will typically be repeated up to approximately 20 times a day until wastes near the center of the tank are removed. The reach of the articulating mast system is approximately 15 feet in all directions from the center of the tank.

Stage 2—When the articulating mast unit has removed tank wastes within its reach, the robotic crawler will be lowered into the tank and remotely controlled to move and/or wash wastes toward the center of the tank where they can be removed by the articulating mast system. The robotic crawler has a plow blade at the front of the crawler for pushing/pulling wastes, a screw pump to jet wastes (if the waste is not too thick) through a small nozzle towards the center of the tank, and also has the ability to direct hot or cold water through the same nozzle to wash wastes

off of in-tank equipment, dissolve waste agglomerations in the tank, and wash wastes toward the center of the tank for removal. The crawler may be operated while the articulating mast system is being operated. The robotic crawler is remotely controlled via hydraulic lines contained in its umbilical cord. The crawler can fit down riser R9 in a closed position and then be hydraulically opened up inside the tank to provide a stable base for the plow blade to move wastes. The umbilical cord attached to the crawler contains hydraulic lines to steer the crawler, raise and lower the plow blade, and a water line(s).

Stage 3—When the crawler has moved as much waste as possible toward the center of the tank for removal, it will direct a water stream through its nozzle to wash off wastes remaining on the tank walls, the tank floor, the articulating mast system, its own umbilical cord, and any other in-tank equipment to minimize the amount of waste left in the tank.

Stage 4—Closure plans are being developed and will be implemented following retrieval of wastes from 241-C-104. It is expected that material may be added to the void space of the tank to prevent dome collapse. Underground lines to and from the tank will be cut and capped and potential air pathways to the atmosphere will be capped or welded shut. Ancillary equipment, including pits, will be removed or isolated from the environment. Since "closure" can be considered equivalent to decommissioning (as defined in WAC 246-247-030(9)), this NOC will be revised (or closure emissions will be added to a future categorical closure NOC) when potential emissions from closure activities can be determined.

Typically, Stages 1 through 3 will be conducted under active ventilation. Due to nuclear safety concerns that operation of the portable exhauster could pull too high of a vacuum and damage the tank (and/or ancillary equipment) when retrieval operations near completion, the exhauster may be turned off for the final stages of waste retrieval.

6.0 EXISTING AND PROPOSED ABATEMENT TECHNOLOGY

Regulatory Citation: "Describe the existing and proposed (as applicable) abatement technology. Describe the basis for the use of the proposed system. Include expected efficiency of each control device, and the annual average volumetric flow rate(s) in meters3/sec for the emission unit(s)."

During preparation and retrieval activities, controls will be established using the following ALARACT Demonstrations. ALARACT 1 "Demonstration for riser preparation/opening," ALARACT 4 "Demonstration for packaging and transportation of waste," ALARACT 5 "Demonstration for soil excavation (using hand tools)," ALARACT 6 "Demonstration for pit access," ALARACT 11, "Demonstration for waste transfers," ALARACT 13 "Demonstration for installation, operation, and removal of tank equipment", ALARACT 14 "Demonstration for pit work", ALARACT 15 "Demonstration for size reduction of waste equipment for disposal", and ALARACT 16 "Demonstration for work on potentially contaminated ventilation system components." Air, water, hydraulic, and electrical lines and a hose-in-hose transfer line, if necessary, may be placed in a shallow (~1 ft. trench) trench using ALARACT 5. See Attachment E for all ALARACT demonstrations that might be used to limit potential emissions during 241-C-104 waste retrieval activities.

Currently, Tank 241-C-104 is passively ventilated through a HEPA filter on riser R2. The filter is a high-efficiency particulate air (HEPA) filter with a manufacturer rated removal efficiency of 99.97%. An active ventilation system will replace the existing passive ventilation system on riser R2 and will consist of a skid mounted HEPA filter (two stages) portable exhauster (POR-008). (A new single stage HEPA inlet filtration system will be connected to riser R6 that will also function as a passive ventilation system when the exhauster is not in use.) Due to operational considerations, this saltwell portable exhauster is preferred for the waste retrieval activity. The portable exhauster would run up to 0.47 m^3/sec (~1000 cfm) and have a demister and heater upstream of the HEPA filters. The portable exhauster will be designed to pass outside air through the tank, thereby reducing condensation and fog within the tank, and filter that air during exhauster operations before exiting to the atmosphere. The portable exhauster will have a demister, heater, a pre-filter, and two stages of high-efficiency particulate air (HEPA) filters that filter air before release to the environment. The exhauster will not be operated at a flow that exceeds the HEPA filter rating in each stage. The abatement technology for the emission unit will undergo routine maintenance, repair, and replacement-in-kind as defined in WAC 246-247-030(22) and (23)(a) and (b) and includes the following:

- Demister,
- Glycol (or similar) heaters and associated components,
- One pre-filter and housing,
- Two HEPA filters and test sections,
- One exhaust fan,
- Stack.

During exhauster operations, air from the tank will pass through the demister and be heated before passing through a pre-filter, two HEPA filters in series, a fan, and discharged through a stack. The stack will contain a section that allows airflow measurements, radiological sample extraction, and potential vapor sampling activities. The pre-filter will increase the life of the HEPA filters by trapping the larger airborne particles to allow for a more economical operating system. As low as reasonably achievable (ALARA) concepts will be applied to allow for less frequent change out of the HEPA filters, thereby reducing exposure to personnel to radiological materials.

The HEPA filters will meet the requirements of ASME AG-1, Section FC and will be tested annually to requirements of ASME N510. The HEPA filters will be nuclear grade throwaway extend-media dry-type in a rigid case having minimum particle collection efficiency of 99.97 percent for 0.3-micrometer median diameter, thermally generated dioctylphthalate particles or other specified challenge aerosols. Pressure drop of a clean filter will be a maximum of one-inch water gauge at a rated flow. The frame will be corrosion resistant for the air stream design conditions. Each filter will have gelatinous or elastomer seal gasket material.

The HEPA filter housing will provide a sealed barrier for the confinement of airborne radionuclides and will serve to encapsulate and hold the HEPA filter. The filter housing will provide for the attachment of pressure differential measurement components. Each filter housing will meet the applicable sections of ASME N509 and the test requirements of ASME N510. The filter housings will be leak tested using the pressure decay method in accordance with ASME N510.

The test sections will provide a means for in place testing of the HEPA filters tested to 99.95 percent efficiency. Testing will confirm that any airborne radionuclide particles are captured to the level of efficiency of the installed HEPA filter. One test section will be placed downstream of the pre-filter section and upstream of the first HEPA filter section. The second test section will be placed between the first stage HEPA filter housing and the second stage HEPA filter housing.

Ductwork will be used to connect the exhauster inlet to the tank riser. Ductwork used will meet requirements of ASME AG-1, Section SA.

The exhaust fan will be constructed of non-sparking materials and will meet Air Movement Contractors Association (AMCA) Standard 99-0401-86 and will be Type A construction. The fan will be a centrifugal type and be statically and dynamically balanced as an assembly. The exhaust stack will house the air velocity probe and the air-sampling probe.

Portable exhauster POR-008 will be operated in accordance with the pre-operational testing per WAC 246-247-060 paragraph 4 and a notice of anticipated startup date will be provided in accordance with 40 CFR 62.09.

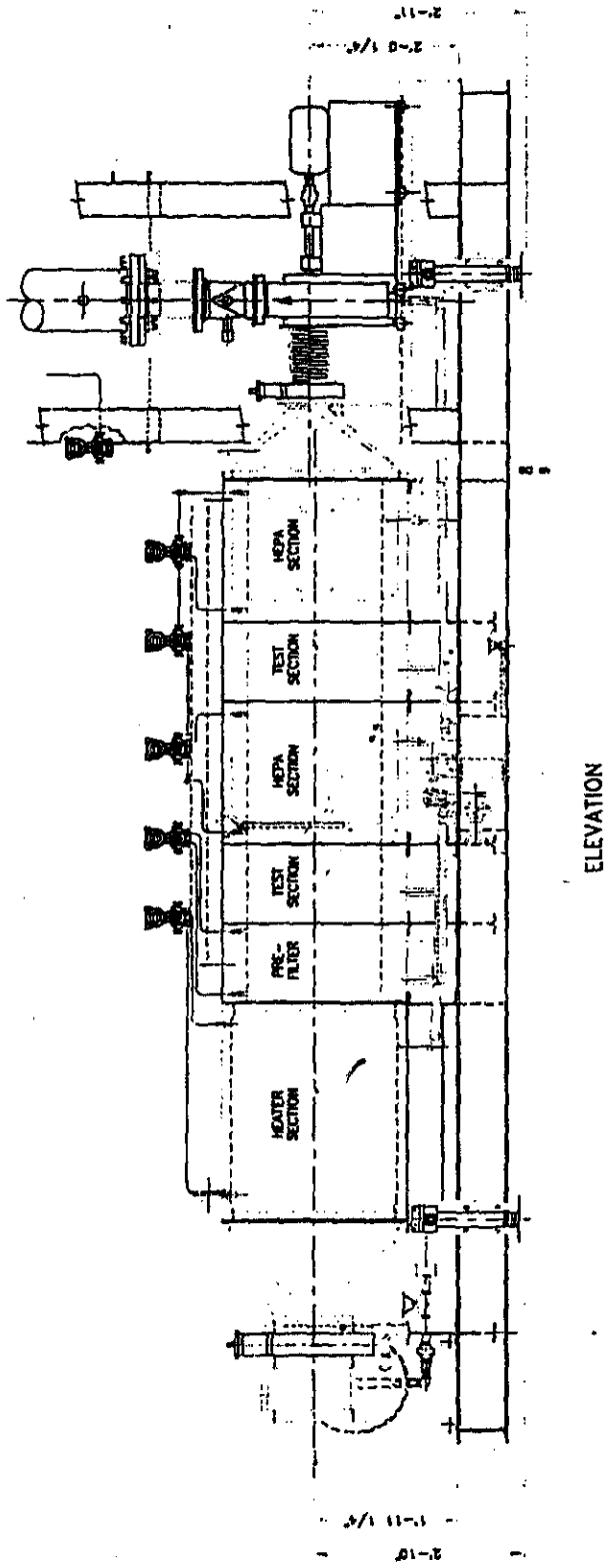
During final retrieval operations (when the tank is nearly empty), the exhauster may be turned off and passive ventilation through the inlet HEPA filter will be allowed to occur.

7.0 APPLICABLE CONTROL TECHNOLOGY DRAWINGS

Regulatory Citation: " Provide conceptual drawings showing all applicable control technology components from the point of entry of radionuclides into the vapor space to release to the environment."

See Figure 3

Figure 3. Typical Ventilation System.



8.0 RADIONUCLIDES OF CONCERN – POTENTIAL EMISSIONS

Regulatory Citation: "Identify each radionuclide that could contribute greater than ten percent of the potential-to-emit TEDE to the MEI."

Radionuclides estimated to contribute greater than ten percent of the potential-to-emit TEDE to the MEI from operation of the waste retrieval at Tank C-104 are assumed to be Sr-90, Cs-137, Pu-239 and Am-241. This is derived by direct application of the CAP-88PC dose conversion factors, discussed in Section 14.0, to the inventory values listed in Table 2 (after determining the release fraction). Multiplying the Curies of each radionuclide by the Off Site Maximum Public Receptor (MPR) Cap-88 Unit Dose factors indicates that Sr-90 would contribute approximately 24%, Cs-137 would contribute approximately 10%, Pu-239 would contribute approximately 20%, and Am-241 would contribute approximately 37% of the dose to the MEI. These four radionuclides are estimated to contribute greater than ninety-one percent of the total dose to the offsite maximum public receptor. Continuous monitoring, as required by 40 CFR 61.93, will be performed during exhauster operations.

9.0 EFFLUENT MONITORING SYSTEM FOR THE PROPOSED CONTROL SYSTEM

Regulatory Citation: "Describe the effluent monitoring system for the proposed control system. Describe each piece of monitoring equipment and its monitoring capability, including detection limits, for each radionuclide that could contribute greater than ten percent of the potential-to-emit TEDE to the MEI, or greater than 0.1 mrem/yr potential-to-emit TEDE to the MEI, or greater than twenty-five percent of the TEDE to the MEI, after controls. Describe the method with detail sufficient to demonstrate compliance with the applicable requirements."

The active ventilation system will sample and monitor the ventilation emissions continuously. The system will collect its sample via a shrouded probe. The installation location, as well as the shrouded probe assembly and transport lines, has been qualified per the applicable requirements of ANSI/HPS N13.1-1999. This is documented in PNNL-11701, *Generic Effluent Monitoring System Certification for Salt Well Portable Exhauster*. Any operations conducted under passive ventilation will involve at least annual periodic confirmatory measurements (smears) taken of the breather filter exhaust housing.

As noted, Sr-90, Cs-137, Pu-239 and Am-241 each contribute greater than ten percent of the potential-to-emit TEDE to the MEI. These same radionuclides each contribute greater than 0.1 mrem/yr potential-to-emit TEDE to the MEI. Am-241 is estimated to contribute approximately eighty-two mrem/yr of the TEDE to the MEI before controls. Cs-137 is estimated to contribute approximately twenty-three mrem/yr, Sr-90 is estimated to contribute approximately fifty-three mrem/yr, and Pu-239 contributes approximately forty-five mrem/yr before controls, respectively. A representative sample of these radionuclides will be collected as a record sample and analyzed in the laboratory. Results will be published in the annual Hanford Site Emission report. The quality and detection limits of these analyses are controlled via the current revisions of the following documents:

HNF-EP-0528, NESHAP Quality Assurance Project Plan for Radioactive Air Emissions

HHF-EP-0835, Statement of Work for Services Provided by the Waste Sampling and Characterization Facility for the Environmental Compliance Program during Calendar Year 2002.

RPP-QAPP-004, Quality Assurance Program Plan for Tank Farm Contractor Radioactive Air Emissions.

10.0 RADIONUCLIDE ANNUAL POSSESSION QUANTITY

Regulatory Citation: "Indicate the annual possession quantity for each radionuclide."

The annual possession quantity for Tank 241-C-104 is listed in Table 2. The inventory data source was:

TWINS3, Best Basis/TCR, Tank Inventory taken on date 8/20/02. This data was dated within TWINS as 1/1/01.

Table 2. Tank C-104 Inventory.

Analyte	Curies
3H	5.61E+01
14C	1.85E+00
60Co	2.72E+02
59Ni	4.58E+00
63Ni	4.29E+02
79Se	6.41E+00
90Sr	4.84E+05
90Y	4.84E+05
93mNb	9.90E+00
93Zr	1.17E+01
99Tc	5.80E+01
106Ru	1.81E-04
113mCd	1.93E+01
125Sb	1.77E+02
126Sn	1.72E+00
129I	7.54E-01
134Cs	4.50E-02
137mBa	9.03E+04
137Cs	9.55E+04
151Sm	9.40E+03
152Eu	2.43E+00

Analyte	Curies
154Eu	1.10E+03
155Eu	8.05E+02
226Ra	6.27E-03
227Ac	1.09E+02
228Ra	2.26E+01
229Th	9.41E-01
231Pa	2.39E+02
232Th	5.58E+00
232U	1.93E+01
233U	4.13E+02
234U	2.08E+01
235U	6.03E-01
236U	6.84E-01
237Np	4.39E+00
238Pu	2.27E+02
238U	1.17E+01
239Pu	5.47E+03
240Pu	1.08E+03
241Am	6.34E+03
241Pu	1.48E+04
242Cm	5.38E+00
242Pu	9.49E-02
243Am	3.12E-01
243Cm	4.31E-01
244Cm	1.50E+01

11.0 PHYSICAL FORM OF EACH RADIONUCLIDE IN THE INVENTORY

Regulatory Citation: "Indicate the physical form of each radionuclide in inventory: Solid, particulate solids, liquid, or gas."

Each radionuclide in the inventory listed in Table 2 is contained in the tank waste, which consists of gases, liquids, and solids. Excavation of soils and removal of particulate debris from pits are expected to be particulate solids.

12.0 RELEASE FORM OF EACH RADIONUCLIDE IN THE INVENTORY

Regulatory Citation: "Indicate the release form of each radionuclide in inventory: Particulate solids, vapor, or gas. Give the chemical form and ICRP 30 solubility class, if known."

The radionuclides in the inventory listed in Table 2 are assumed to be released as liquids or solids, except for H-3, C-14, Ru-106, and I-129, which will be released as gases.

13.0 RELEASE RATES

Regulatory Citation:
"a. New emission unit(s): Give predicted release rates without any emission control equipment (the potential-to-emit) and with the proposed control equipment using the efficiencies described in subsection 6 of this section.
b. Modified emission unit(s): Give predicted release rates without any emissions control equipment (the potential-to-emit) and with the existing and proposed control equipment using the efficiencies described in subsection 6 of this section. Provide the latest year's emission data or emissions estimates.

Abated emissions from passive and diffuse sources (including the 241-C-104 tank) were reported in DOE/RL-2002-20, *Radionuclide Air Emissions Report for the Hanford Site, Calendar Year 2001*. Abated emissions from all the Hanford Site sources were 0.49 mrem.

13.1 Pit Opening

The Annual Possession Quantity (APQ) for the removal of the heel pit and pump cover at 241-C-104 is based on historical smear data from the inside of the pit covers. For conservatism, the highest smear data recently measured was used for all six sides of the pit. Contamination levels measured were about 1E+06 dpm beta/gamma, and <1400 dpm alpha. These values were used for the calculated emissions. The total surface area values were calculated for the heel pit and pump pit (the total surface area was multiplied by 2X to take into account equipment in the pits and to accommodate for some variation in contamination levels) for a total of four openings. The APQ for this activity was calculated at 3.79E-02 Curies. Both the unabated and abated dose is calculated as 4.85E-06 mrem/year offsite. The calculations used are presented in Appendix A.

The APQ for the removal of the heel pit cover at 241-AY-101 (receiver tank for the retrieved wastes from 241-C-104) is based on historical smear data from the inside of the pit covers. For conservativism, the highest smear data was used for all six sides of the pit. The maximum removal contamination is expected to be below 8.5E+05 dpm beta/gamma and <20 dpm alpha. These values were used for the calculated emissions when opening the heel pit at 241-AY-101. The total surface area value was calculated for the heel pit (the total surface area was multiplied by 2X to take into account equipment in the pit and to accommodate for some variation in contamination levels) for a total of two openings. The Annual Possession Quantity was calculated to be 9.55E-03 Curies. Both the unabated and abated dose is calculated as 1.05E-06 mrem/year offsite. The calculations used are presented in Appendix A.

13.2 Equipment Removal

The unabated emissions estimate for the removal of in tank equipment was determined by assuming a 0.16 centimeter (0.063 inches) layer of the 241-C-104 tank inventory being uniformly distributed across the surface area of the equipment removed from the 241-C-104 tank. The calculation applies the 40 CFR 61 Appendix D release factor for particulates to the total volume contained over that surface area. The equipment planned for removal includes a pump in riser #13, another pump in riser 6, a sludge pump in riser #9, and an Enraf in riser #8. The Annual Possession Quantity was calculated to be 4.61E+00 Curies. Both the calculated unabated and abated emissions are 2.54E-02 mrem/year. The potential unabated emissions from

in-tank equipment removals are shown in appendix B and include calculated emissions for one additional piece of large in tank equipment, as a contingency.

13.3 Soil Excavation

The calculation assumes a maximum of 1E+05 dpm beta and 20 dpm alpha of contamination in excavated soils. The beta-gamma contributing radionuclide was assumed to be Sr-90 and the alpha contributing radionuclide was assumed to be Am-241 to be conservative. These values were multiplied with the appropriate dose conversion factors and the maximum volume of soil to be excavated. The average soil density was assumed to be 1590 kg/m^3 (98 lbs/ft^3). A total of 5000 ft^3 of contaminated soil was calculated to be excavated within C-Farm, AY-Farm, and from C-Farm to the AY-Farm (if soil contamination is detected). The APQ from soil excavation activities was calculated at 7.94E+00 Curies. Both the abated and unabated dose for soil excavation is 1.69E-03 mrem/year offsite. Calculations are in Appendix C.

13.4 Liquid and Solids Removal Under Ventilation

The APQ and release rates for the tank are based upon using a release fraction of 1 for gases, 10-3 for liquids and solids per 40 CFR 61, Appendix D. (Future NOC applications may use a different release fraction for liquid and particulate releases, after a study by PNNL is conducted to determine the actual release fraction for this type of equipment.) The tank contains 29,000 gallons of liquids contained in a total tank volume of 259,000 gallons of sludge (HNF-EP-0182-174). The releases were calculated to be continuous. The calculations performed are presented in Appendix D.

For retrieval of 259,000 gallons of liquids and solids (gases are expected to all be released during retrieval), the total APQ was conservatively calculated to be 1.19E+06 Curies. The unabated emissions were calculated to be 2.23E+02 mrem/yr and abated emissions would be 2.67E-01 mrem/yr. Abated emissions for active ventilation were determined by dividing the unabated results by 2000, the usual HEPA filter decontamination factor, which represents an in-place tested particulate removal efficiency of 99.95%. No decontamination factor was used for H-3, C-14, I-129, and Ru-106. For these radionuclides, the unabated emissions equal the abated emissions (based on the assumption that the HEPA filters are not designed to control this type of emission). These active ventilation emission values would also bound emissions when the tank is being passively ventilated due to the much lower airflow rates.

14.0 DISTANCES AND DIRECTION OF THE MAXIMALLY EXPOSED INDIVIDUAL

Regulatory Citation: "Identify the MEI by distances and direction from the emission unit(s). The MEI is determined by considering distance, windrose data, presence of vegetable gardens, and meat or milk producing animals at unrestricted areas surrounding the emission unit."

The MEI is determined using CAP-88 dispersion factors, which are derived for use on the Hanford Site and published in HNF-3602, Revision 1, *Calculating Potential-to-Emit Releases and Doses for FEMPs and NOCs*. Values used for the 241-C-104 tank were taken from Table 4-9, for 200 E Area with effective release height < 40 m. Unit dose factors from both the On Site maximum public receptor (MPR) and Off Site MPR were examined. The Off Site MPR Unit

Dose factors were used to perform the final calculations as they were determined to return the highest values. In this case, according to HNF-3602, Table 4-2, the MEI is 16,000 meters in the east direction.

15.0 TOTAL EFFECTIVE DOSE EQUIVALENT TO THE MAXIMALLY EXPOSED INDIVIDUAL

Regulatory Citation: "Calculate the TEDE to the MEI using an approved procedure (see WAC 246-247-085). For each radionuclide identified in subsection 8 of this section, determine the TEDE to the MEI for existing and proposed emission controls, and without any emission controls (the potential-to-emit) using release rates from subsection 13 of this section. Provide all input data used in the calculations."

The doses discussed in Sections 13.1 through 13.4 were added together to determine the Total Effective Dose Equivalent (TEDE) to the Maximally Exposed Individual (MEI). The TEDE to the MEI is calculated to be 2.23E+02 mrem/yr (unabated) and 2.94E-01 mrem/yr (abated). The dose contribution from each activity (calculated in Appendices A through D) is shown below:

	Offsite Unabated Dose (mrem/yr)	Offsite Abated Dose (mrem/yr)
Pit Openings		
--C-104	4.85E-06	4.85E-06
--AY-101	1.05E-06	1.05E-06
Equipment Removal	2.54E-02	2.54E-02
Soil Excavation	1.69E-03	1.69E-03
Active and Passive Ventilation	2.23E+02	2.67E-01
TOTAL	2.23E+02	2.94E-01

16.0 COST FACTORS

Regulatory Citation: "Provide cost factors for construction, operating, and maintenance of the proposed control technology components and system, if a BARCT or ALARACT demonstration is not submitted with the NOC."

Pursuant to WAC 246-247-110, Appendix A (16), cost factors for construction, operation, and maintenance of proposed technology requirements are not required, as the Washington State Department of Health (WDOH) has provided guidance that HEPA filters are generally considered best available radionuclide control technology (BARCT) for particulate emissions. Because the key radionuclides of concern are particulates, it is proposed that the HEPA filter controls described in Section 6.0 be accepted as BARCT. Compliance with the substantive BARCT technology standards is described in Section 18.0.

17.0 FACILITY PROCESS ESTIMATED LIFETIME

Regulatory Citation: "Provide an estimate of the lifetime for the facility process with the emission rates provided in this application."

Field activities to support equipment removal and installation could begin as early as summer of 2003. Waste removal activities are expected to begin in 2004/2005 and be completed no later than 2006. Closure activities for 241-C-104 could begin following the completion of retrieval activities, but would require a revision to this NOC or inclusion of 241-C-104 into a categorical NOC addressing closure for multiple tanks.

18.0 CONTROL TECHNOLOGY STANDARDS

Regulatory Citation: "Indicate which of the following control technology standards have been considered and will be complied with in the design and operation of the emission unit(s) described in this application: . . ."
ASME/ANSI AG-1, ASME/ANSI N509, ASME/ANSI N510, ANSI/ASME NQA-1, 40 CFR 60, Appendix A Methods 1, 1A, 2, 2A, 2C, 2D, 4, 5, and 17, and ANSI N13.1

The passive and active ventilation systems have been designed to meet the required WAC-246-247-110 control technology standards as described in the following table and discussion.

Table 3. Breather Filter Standards Comparison.

Standard	Does design comply?	Notes
ASME/ANSI AG-1	Yes	Filters installed and G-1 housing design meet ASME AG-1.
ASME/ANSI N509	Yes	Filters installed and G-1 housing design meet ANSI N509.
ASME/ANSI N510	Yes	Filters are testable per ANSI N510.
ANSI/ASME NQA-1	Yes	Current version of QA program is performed in accordance with TFC-PLN-02, "Quality Assurance Program Description".
ANSI N13.1	NA	Confirmatory measurements will consist of smears on the filter.
40 CFR 60, Appendix A Test Methods: 1, 1A, 2, 2A, 2C, 2D, 4	NA	ASME N510 filter testing requires airflow measurements. Other methods not required because flow rates vary based upon barometric breathing.
40 CFR 60, Appendix A Test Methods: 5, 17	NA	These methods are for sampling system designs. Periodic confirmatory measurements will be taken via smears in lieu of a sampling system.

PORTABLE EXHAUSTER (POR-008)

The following is a summary of standards compliance. For a more thorough evaluation, see "Codes and Standards Evaluation for POR-008 Portable Exhauster," by J.R. Kriskovich (previously provided to WDOH staff).

ASME/ANSI AG-1

American Society for Engineers (ASME)/American National Standards Institute (ANSI) AG-1: This equipment specific code consists of several primary sections, which are applicable to this unit. The applicable sections are fans (Section BA), ductwork (Section SA), HEPA filter housing (Section HA), HEPA filters (Section FC), dampers (Section DA), heaters (Section CA), moisture separators (Section FA), Field Testing of Air Treatment Systems (Section TA), and Quality Assurance (QA) (Section AA).

The fan section of AG-1 (Section BA) covers the construction and testing requirements for fans. This fan meets the applicable criteria identified in AG-1, except as identified below. It was constructed to the Air Movement and Control Association (AMCA) 99-401, "Spark Resistant Construction," criteria, and was tested to the applicable sections of AMCA 210. However, it cannot be shown the shaft leakage criteria are met (Section BA 4142.2). This is acceptable because a "stuffing box" is installed around the shaft to minimize the leakage, and the leakage point is located downstream of the HEPA filters.

The next applicable requirement is the ductwork section of AG-1 (Section SA). As was the case for the fan, this section identifies several requirements for ductwork. This includes acceptable material, fabrication, and testing criteria. The ductwork used to connect the exhauster to riser R2 and the exhauster ductwork itself will be a combination of both metal and flexible polymer. In both cases it meets the applicable criteria and will be pressure tested per the applicable criteria identified in AG-1 and N510 prior to operation

The HEPA filter housing section (Section HA) was recently released and this section has taken the place of the requirements identified in N509. After reviewing the requirements identified in Section HA against the portable exhauster design, the portable exhauster filter housings are in compliance.

The HEPA filter section of AG-1 (Section FC) is also applicable in this instance. The filters, which will be installed in the exhauster, will meet the applicable sections of AG-1, except for two areas dealing with filter qualification testing. Justification for this exception was discussed with and approved by WDOH at the December 1998 Routine Technical Assistance Meeting. The dampers installed on the portable exhauster do meet the applicable AG-1, section DA. This includes design, construction and testing. The manufacturer performed a leak test on the valves, and a pressure decay test was also completed on the exhaust train system. For the pressure decay test, the valves were used for isolation. The test was successful.

The heater installed in the portable exhauster meets the requirements of AG-1, Section CA. The heater relies on a glycol mixture that is heated by a separate heating unit, similar to a hot water tank. The heated glycol is then pumped through the heating coil located inside the exhaust system. This type of design allows the system to be used in a flammable gas environment. By using a glycol heater, there are no electrical, sparking or energized components in contact with

the air stream. In addition, controls are in place to prevent the damage of the HEPA filters if the coil were to fail. This includes level detection in the glycol reservoir, which will detect the loss of glycol. Differential pressure across the first HEPA filter is monitored. If the coil were to break, the differential pressure across the first HEPA would increase and the system would be shutdown.

Field testing of exhauster components (Section TA) has been conducted. Several elements only require visual examination; however, most elements required actual tests. These tests were passed or determined to not apply to the exhauster.

The quality assurance section of AG-1 relies on ASME NQA-1. The general QA criteria are located in Section AA. Specific component/system criteria are located in each section throughout AG-1. The portable exhauster was built on the Hanford Site and meets the site's QA program. This includes procurement of the safety material/components, along with appropriate pedigree from an evaluated supplier, tracking and maintaining the material/components after it arrived on site, inspection of the material/components, and witnessing the testing. Based on the above, these components meet the AG-1 criteria.

The only deviation requested from AG-1 for a component used in portable exhauster POR-008 is for the de-mister. Although it could not be shown that the de-mister meets some of the requirements of AG-1 Section FA, the requirements not being met are not substantial to the operation of the system. For example, even though a certificate of compliance could not be located for the de-mister pad due to a fire at the manufacturers facility, the pad is acceptable based on the testing that was performed on the pad. Furthermore, differential pressure is measured across the pad to assure that the pad is structurally sound and provides a tortuous path for the air stream.

It could not be shown that the welds were inspected per the AG-1 Section FA requirements. Again, this is considered acceptable based on testing that was performed at the facility. Furthermore, the pad is not relied upon for particulate removal, but rather removal of entrained moisture. Therefore, if any defects exist in the welds, such as a leak path, this is not a significant issue because this would still provide a tortuous path for the air stream. As for structural strength of the weld, the system is not relied upon to survive an earthquake, nor relied upon to remove radioactive particulate. Therefore, if the welds fail it would not result in a release of contamination.

The same discussion presented above for the structural integrity of the welds holds true for the rough handling test required as part for AG-1 Section FA. Since the demister is not relied upon to remove radioactive particulate and is not relied upon to operate during or after a seismic event, it is not relevant whether the system can withstand rough handling.

Based on the analysis presented above for AG-1 Section FA, it is proposed that the changes noted above be found acceptable.

ASME N509

This standard deals with the individual components and how they relate to the overall system. The major sections of ASME/ANSI N509 have been replaced with those identified in AG-1. There are certain sections that are still applicable, such as Section 4.3, which discusses the

maximum flow rate for the system not to exceed the lowest maximum rating of any component installed in the system. This is being met, along with the other applicable sections of N509.

ASME N510

This standard pertains to the testing of nuclear air cleaning systems. The first requirement identified in ASME/ANSI N510 is to perform a pressure decay test. This is to assure there are no infiltration or outward leak paths from the system. This test was completed on the portable exhauster and was successful.

This system meets the leak test criteria identified per N510. Test sections are located in the exhaust train to allow for proper independent testing of both HEPA filters.

Quality Assurance

The required technology standard is ANSI/ASME NQA-1, "Quality Assurance Program requirements for Nuclear Facilities." Quality Assurance for the ventilation system has been performed in accordance with TFC-PLN-02, "Quality Assurance Program Description."

Stack Volumetric Flow Rate Determination Methods

Stack effluent flow rates are necessary to compile emissions and complete the required annual reports. Requirements for flow rates can be broken into three areas of discussion:

1. Measurements Location: The regulatory methods that specify the measurement location, distances from flow disturbances, number of measurements to take, etc. are provided in the following two methods:

   - 40 CFR 60, Appendix A, Methods 1 – Sample and Velocity Traverses for Stationary Sources.

   - 40 CFR 60, Appendix A, Methods 1A - Sample and Velocity Traverses for Stationary Sources with Small Stacks or Ducts.

The difference in these two methods is that one is for stacks 12 inches in diameter and larger, and the other is for under 12 inches. The exhauster stack is smaller than 12 inches. Therefore, Method 1A is followed for this exhauster.

2. Measurement Method: The regulatory method that specify the measurement method and instrumentation to use are as follows:

   - 40 CFR 60, Appendix A, Methods 2 – Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Picot Tube).

   - 40 CFR 60, Appendix A, Methods 2A – Direct Measurement of Gas Volume Through Pipes and Small Ducts

   - 40 CFR 60, Appendix A, Methods 2C – Determination of Gas Velocity and Volumetric Flow Rate in Small Stacks or Ducts (Standard Picot Tube). This method is applicable for the determination of average velocity and volumetric flow rate of gas streams in small stacks or ducts.

- 40 CFR 60, Appendix A, Methods 2D – Measurement of Gas Volume Flow Rates in Small Pipes and Ducts.

Either Method 2 or Method 2C are used in Tank Farms. The primary difference between Method 2 and 2C lies in the fact that Method 2 is applicable for stacks larger than 12 inches in diameter, while 2C applies to stack smaller than 12 inches. Method 2C is followed for this exhauster.

3. Measurement Result: Flow rates are to be reported in dry standard units of temperature and pressure. This means that the moisture content of the air stream must be taken into account when finalizing the flow rate values. Method 2 and Method 2C (through reference to Method 2) call the following method for this determination:

- 40 CFR 60, Appendix A, Methods 4 – Determination of Moisture Content in Stack Gases. This method is applicable to determination of moisture content in stack gas. This method is called out for use in Method 2 and 2C (through call out of Method 2). Method 2 requires that flow rates be converted to dry standard units

This method is not used. Instead a humidity probe is used to determine moisture content of the stream. The humidity value determined from this instrument is mathematically incorporated into the final flow rate measurement.

In addition to the methods just discussed; 40 CFR 52, Appendix E – Performance Specifications and, Specification Test Procedures for Monitoring Systems for Effluent Stream Gas Volumetric Flow Rate – is also used. The methods discussed above are for manual measurements. The Appendix E method allows for the installation and operation of instrumentation to automatically and continuously takes flow rate measurements. The Appendix E method requires use of Method 2 for use in comparison of the instrumentation readings and if after a series of measurements are taken the instrument accuracy is determined to be within that specified by the Appendix E method, the instrumentation is considered acceptable and can be used for flow rate determination and emission reporting purposes. The exhauster has been tested to Appendix E.

Sampling System Design Methods and Standards

Methods and Standards called out for sampling system design are as follows:

- 40 CFR 60, Appendix A, Methods 5 – Determination of Particulate Matter Emissions from Stationary Sources. This method is applicable for the determination of particulate emissions. This method details the sample probe, collection filter and holder, the vacuum system and instrumentation that might be used in the design of a particulate sample collection system.

- 40 CFR 60, Appendix A, "Methods 17 – Determination of Particulate Matter Emissions from Stationary Sources." This method is applicable for determination of particulate matter (PM) emissions, where PM concentrations are known to be independent of temperature over the normal range of temperatures characteristic of emissions from a specified source category. It is intended for use only when specified by an applicable subpart of the standards, and only within the applicable temperature limits (if specified), or when otherwise approved by the Administrator. There are other provisions for use of this method. This method details the sample probe, collection filter and holder, the

vacuum system and instrumentation that might be used in the design of a particulate sample collection system.

- ANSI N13.1-1969, *Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities.*

- ANSI/HPS N13.1-1999, sampling and Monitoring Releases of Airborne Radioactive Substances from Stacks and Ducts of Nuclear Facilities:

No attempts have been made to design the sampling and monitoring system to Methods 5 and 17. Instead, the system has been designed to meet the intent of ANSI/HPS N13.1-1999. A shrouded probe assembly is installed. The installation location, as well as the shrouded probe assemble, to include transport lines, has been qualified per the applicable requirements of ANSI/HPS N13.1-1999. This is documented in PNNL-11701, *Generic Effluent Monitoring System Certification for Salt Well Portable Exhauster.*

REFERENCES

40 CFR 60, "Standards for Performance of New Stationary Sources," *Code of Federal Regulations*, as amended.

40 CFR 61, "National Emission Standards for Hazardous Air Pollutant." *Code of Federal Regulations*, as amended.

AMCA Standard 99-0401-86, Air Movement Contractors Association, Chicago, Illinois

ANSI/ASME AG-1, 1997, *Code on Nuclear Air and Gas Treatment*, American Society of Mechanical Engineers, New York, New York.

ANSI/ASME NQA-1, *Quality Assurance program Requirements for Nuclear Facilities*, American Society of Mechanical Engineers, New York, New York.

ANSI/HPS N13.1, 1999, *Sampling and Monitoring Releases of Airborne Radioactive Substances from Stacks and Ducts of Nuclear Facilities*, American National Standards Institute, New York, New York.

ANSI N13.1, 1969, *Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities*, American National Standards Institute, New York, New York.

ANSI N509, *Nuclear Power Plant Air Cleaning Units and Components*, American National Standards Institute, New York, New York.

ANSI N510, *Testing of Nuclear Air Treatment Systems*, American National Standards Institute, New York, New York.

DOE/RL-2002-20, *Radionuclide Air Emissions Report for the Hanford Site, Calendar Year 2001*, U.S. Department of Energy Richland Operations Office, Richland, Washington.

HNF-EP-0182-174, *Waste Tank Summary Report for Month Ending, September 30, 2002*, CH2M HILL Hanford Group, Inc., Richland, Washington.

HNF-SD-WM-TI-797, 1998, *Results of Vapor Space Monitoring of Flammable Gas Watch List Tanks*, Rev. 3, Lockheed Martin Hanford Company and DE&S Hanford, Inc., Richland, Washington.

HNF-0528, Revision 4, *National Emission Standards for Hazardous Air Pollutants (NESHAP) Quality Assurance Project Plan for Radioactive Airborne Emissions*, Flour Hanford Group, Inc., Richland Washington

HNF-3602, Revision 1, 2002, *Calculating Potential-to-Emit Release and Dose for FEMP and NOCs*. Flour Hanford. Group Inc., Richland, Washington.

Kriskovich, J.R., *Code and Standards Evaluation for POR-008 Portable Exhauster*, September 22, 2002, Vista Engineering Technologies, L.L.C.

Pacific Northwest National Laboratory correspondence to Mr. Gary Wells, dated August 27, 2001

RPP-MP-600, 2000, *QA Program Description for the Tank Farm Contractor,* CH2M HILL Hanford Group, Inc., Richland, Washington.

HNF-4327, Revision 1A, 2002, *Control of Airborne Radioactive Emissions for Frequently Performed TWRS Work Activities (ALARACT Demonstrations)*, CH2MHILL Hanford Group, Inc., Richland, Washington.

HNF-5267, Revision 2, 1999, *Waste Retrieval Sluicing System Campaign Number 3 Solids Volume Transferred Calculation*, Lockheed Martin Hanford Corp., Richland, Washington.

WAC 197-11-845, *State Environmental Policy Act,* "SEPA Rules, Department of Social and Health Services," *Washington Administration Code*, as amended.

WAC 246-247, "Radiation Protection – Air Emissions," *Washington Administrative Code,* as amended.

Appendix A

Calculations for Pit Opening

Pit Openings at C-104 To Support Retrieval

Release Fraction	1.00E-03						
Maximum Interior Surface Area of Two Pits * 2 (to take into account equipment in the pits)	2.10E+06	cm^2	2.26E+03	ft^2			
Number of Entries (M)	4						
	Smear Removable Concentration (dpm/100 cm2)*	Conversion (dpm/100cm^2) to (Ci/cm^2)	Smear Concentration (Ci/cm^2)	Possession Quantity (Ci)	Unabated Release (Ci/Yr)	Offsite Dose Factor (mrem/Ci) [a]	Unabated Dose (mrem/yr)
	A	B	C=A*B	D=(SA)*C*M	E=RF*D	G	H=E*G
Alpha (AM-241)	1400	4.50E-15	6.30E-12	5.30E-05	5.30E-08	1.30E+01	6.89E-07
Beta (Sr-90)	1.00E+06	4.50E-15	4.50E-09	3.79E-02	3.79E-05	1.10E-01	4.17E-06
Total				3.79E-02	3.79E-05		4.85E-06

Heel Pit is 405 ft^2 interior surface area or 12 ft by 9 ft by 4.5 ft deep 405 ft^2

Pump Pit is 727 ft^2 interior surface area or 11 ft by 14.5 ft by 8 ft deep 727 ft^2

Conversion from ft^2 * (144in^2/1ft^2)*(6.452cm^2/1in^2) = cm^2

Heel Pit Survey Report No. SST-018187

Heel Pit Contamination is used for Pump Pit also for conservatism

Appendix A (continued)

Pit Openings at AY-101 to Support C-104 Retrieval

Release Fraction	1.00E-03						
Maximum Interior Surface Area of Two Pits * 2 (to take into account equipment in the pits)	1.25E+06	cm^2	1.34E+03	ft^2			
Number of Entries (M)	2						
	Smear Removable Concentration (dpm/100 cm2)*	Conversion (dpm/100cm^2) to (Ci/cm^2)	Smear Concentration (Ci/cm^2)	Possession Quantity (Ci)	Unabated Release (Ci/Yr)	Offsite Dose Factor (mrem/Ci) [a]	Unabated Dose (mrem/yr)
	A	B	C=A*B	D=(SA)*C*M	E=RF*D	G	H=E*G
Alpha (Am-241)	20	4.50E-15	9.00E-14	2.25E-07	2.25E-10	1.30E+01	2.92E-09
Beta (Sr-90)	8.50E+05	4.50E-15	3.83E-09	9.55E-03	9.55E-06	1.10E-01	1.05E-06
Total				9.55E-03	9.55E-06		1.05E-06

Heel Pit is 672 ft^2 interior surface area or 12 ft by 12 ft by 8 ft deep 672 ft^2

Conversion from ft^2 * (144in^2/1ft^2)*(6.452cm^2/1in^2) = cm^2

Heel Pit Survey Report No. DSTP-003007

Crack smears are the highest contamination smears and are translated over the entire pit interior for conservatism

Appendix B
Calculations for Equipment Removal

Potential Unabated Emissions and Dose
For Equipment Removal Activities

Pump in riser #13	5,425.92	in^2
Contingency equipment	32555.52	in^2
Sludge pump in riser #9	5425.92	in^2
Pump in riser #6	5425.92	in^2
Enraf in riser #8	5425.92	in^2
Total Contaminated Surface Area	54,259.20	In^2
Waste Layer Thickness	0.063	Inches
Waste Volume on Equipment * 2 volumes for conservatism	29.58	Gallons

Analyte	Inventory Ci	Ci per gallon	Inventory on Equipment Ci	Release Fraction	Unabated Release Ci	Cap-88 OffSite MPR mrem/Ci	Offsite Unabated Dose mrem/yr	Contribution to Dose %
	A	B	C=B*Vol	D	E=C*D	F	H=E*F	I=H/Sum of H
3H	5.61E+01	2.17E-04	6.41E-03	1.00E+00	6.41E-03	2.50E-05	1.60E-07	0.00%
14C	1.85E+00	7.14E-06	2.11E-04	1.00E-03	2.11E-07	1.90E-03	4.01E-10	0.00%
60Co	2.72E+02	1.05E-03	3.11E-02	1.00E-03	3.11E-05	3.10E-04	9.63E-09	0.00%
59Ni	4.58E+00	1.77E-05	5.23E-04	1.00E-03	5.23E-07	2.50E-01	1.31E-07	0.00%
63Ni	4.29E+02	1.66E-03	4.90E-02	1.00E-03	4.90E-05	2.60E-04	1.27E-08	0.00%
79Se	6.41E+00	2.47E-05	7.32E-04	1.00E-03	7.32E-07	1.30E-01	9.52E-08	0.00%
90Sr	4.84E+05	1.87E+00	5.53E+01	1.00E-03	5.53E-02	1.10E-01	6.08E-03	23.89%
90Y	4.84E+05	1.87E+00	5.53E+01	1.00E-03	5.53E-02	3.40E-04	1.88E-05	0.07%
93mNb	9.90E+00	3.82E-05	1.13E-03	1.00E-03	1.13E-06	2.10E-03	2.37E-09	0.00%
93Zr	1.17E+01	4.52E-05	1.34E-03	1.00E-03	1.34E-06	1.30E-03	1.74E-09	0.00%
99Tc	5.80E+01	2.24E-04	6.62E-03	1.00E-03	6.62E-06	2.30E-02	1.52E-07	0.00%
106Ru	1.81E-04	6.99E-10	2.07E-08	1.00E-03	2.07E-11	1.60E-02	3.31E-13	0.00%
113mCd	1.93E+01	7.45E-05	2.20E-03	1.00E-03	2.20E-06	1.30E-01	2.87E-07	0.00%
125Sb	1.77E+02	6.83E-04	2.02E-02	1.00E-03	2.02E-05	2.60E-02	5.26E-07	0.00%
126Sn	1.72E+00	6.64E-06	1.96E-04	1.00E-03	1.96E-07	4.70E-02	9.23E-09	0.00%
129I	7.54E-01	2.91E-06	8.61E-05	1.00E+00	8.61E-05	2.00E-01	1.72E-05	0.07%
134Cs	4.50E-02	1.74E-07	5.14E-06	1.00E-03	5.14E-09	1.00E-01	5.14E-10	0.00%
137mBa	9.03E+04	3.49E-01	1.03E+01	1.00E-03	1.03E-02	5.30E-13	5.47E-15	0.00%
137Cs	9.55E+04	3.69E-01	1.09E+01	1.00E-03	1.09E-02	2.40E-01	2.62E-03	10.29%
151Sm	9.40E+03	3.63E-02	1.07E+00	1.00E-03	1.07E-03	7.50E-04	8.05E-07	0.00%
152Eu	2.43E+00	9.38E-06	2.77E-04	1.00E-03	2.77E-07	2.40E-01	6.66E-08	0.00%

154Eu	1.10E+03	4.25E-03	1.26E-01	1.00E-03	1.26E-04	2.00E-01	2.51E-05	0.10%
155Eu	8.05E+02	3.11E-03	9.19E-02	1.00E-03	9.19E-05	8.00E-03	7.35E-07	0.00%
226Ra	6.27E-03	2.42E-08	7.16E-07	1.00E-03	7.16E-10	4.60E-01	3.29E-10	0.00%
227Ac	1.09E+02	4.21E-04	1.24E-02	1.00E-03	1.24E-05	1.50E+01	1.87E-04	0.73%
228Ra	2.26E+01	8.73E-05	2.58E-03	1.00E-03	2.58E-06	1.90E-01	4.90E-07	0.00%
229Th	9.41E-01	3.63E-06	1.07E-04	1.00E-03	1.07E-07	1.60E+01	1.72E-06	0.01%
231Pa	2.39E+02	9.23E-04	2.73E-02	1.00E-03	2.73E-05	1.20E+01	3.28E-04	1.29%
232Th	5.58E+00	2.15E-05	6.37E-04	1.00E-03	6.37E-07	8.00E+00	5.10E-06	0.02%
232U	1.93E+01	7.45E-05	2.20E-03	1.00E-03	2.20E-06	1.10E+01	2.42E-05	0.10%
233U	4.13E+02	1.59E-03	4.72E-02	1.00E-03	4.72E-05	3.10E+00	1.46E-04	0.57%
234U	2.08E+01	8.03E-05	2.38E-03	1.00E-03	2.38E-06	3.10E+00	7.36E-06	0.03%
235U	6.03E-01	2.33E-06	6.89E-05	1.00E-03	6.89E-08	3.00E+00	2.07E-07	0.00%
236U	6.84E-01	2.64E-06	7.81E-05	1.00E-03	7.81E-08	2.90E+00	2.27E-07	0.00%
237Np	4.39E+00	1.69E-05	5.01E-04	1.00E-03	5.01E-07	1.20E+01	6.02E-06	0.02%
238Pu	2.27E+02	8.76E-04	2.59E-02	1.00E-03	2.59E-05	7.60E+00	1.97E-04	0.77%
238U	1.17E+01	4.52E-05	1.34E-03	1.00E-03	1.34E-06	2.80E+00	3.74E-06	0.01%
239Pu	5.47E+03	2.11E-02	6.25E-01	1.00E-03	6.25E-04	8.20E+00	5.12E-03	20.13%
240Pu	1.08E+03	4.17E-03	1.23E-01	1.00E-03	1.23E-04	8.20E+00	1.01E-03	3.97%
241Am	6.34E+03	2.45E-02	7.24E-01	1.00E-03	7.24E-04	1.30E+01	9.41E-03	36.99%
241Pu	1.48E+04	5.71E-02	1.69E+00	1.00E-03	1.69E-03	1.30E-01	2.20E-04	0.86%
242Cm	5.38E+00	2.08E-05	6.14E-04	1.00E-03	6.14E-07	4.10E-01	2.52E-07	0.00%
242Pu	9.49E-02	3.66E-07	1.08E-05	1.00E-03	1.08E-08	7.80E+00	8.45E-08	0.00%
243Am	3.12E-01	1.20E-06	3.56E-05	1.00E-03	3.56E-08	4.10E-01	1.46E-08	0.00%
243Cm	4.31E-01	1.66E-06	4.92E-05	1.00E-03	4.92E-08	8.50E+00	4.18E-07	0.00%
244Cm	1.50E+01	5.79E-05	1.71E-03	1.00E-03	1.71E-06	6.70E+00	1.15E-05	0.05%
			4.61E+00			-Total	2.54E-02	100.00%

241-C-04B pump (riser #13) is 36 ft x 4 in diameter

Contingency equipment is 36ft x 12 in diameter (assumes contamination on inside and outside of equipment)

241-C-04A sludge pump (riser #9) is 36 ft x 4 in diameter

241-C-04A pump (riser #6) is 36 ft x 4 in diameter

Riser #8 Enraf is 36 ft x 4 in diameter

Dimensions from Mobile Retrieval System 90% Design Review Briefing, August 2002

Conversion from in^3 to gal, is
in^3*(16.387cm^3/1in^3)*(1l/1000cm^3)*(0.264gal/1liter)

Total volume of contamination on equipment is multiplied by 2X for conservatism

Total volume of tank contents are 259,000 gallons

Appendix C
Calculations for Soil Excavation

POTENTIAL UNABATED EMISSIONS AND DOSE FOR SOIL EXCAVATION ACTIVITIES

HAND DIGGING SOIL EXCAVATION ACTIVITIES FOR C-104 RETRIEVAL

MAXIMUM SOIL EXCAVATED	5,000	FEET^3		
SOIL DENSITY	98	POUNDS/FEET^3		
TOTAL MASS OF SOIL (TMS)	2.22E+08	GRAMS		
MAXIMUM READING (MR) ALPHA	20	CPM		
MAXIMUM READING (MR) BETA/GAMMA	100,000	CPM	1,000,000	dpm/probe*
RELEASE FRACTION (RF)	1.00E-03			

ASSUMED ISOTOPE	CONVERSION FACTOR (pCi/gram)/cpm (a)	POSSESSION QUANTITY Ci (b)	UNABATED RELEASE, Ci	OFFSITE DOSE FACTOR, mrem/Ci (c)	ONSITE DOSE FACTOR, mrem/Ci	UNABATED & Abated DOSE, mrem/yr (d)	UNABATED & Abated DOSE, mrem/yr	% UNABATED DOSE
				OffSite MPR	OnSite MPR	OffSite MPR	OnSite MPR	OffSite MPR
	A	B =A*TMS*MR/1E12	C =B*RF	D	E	E =C*D	G =C*E	F =E/sum E
Sr-90	0.35	7.87E+00	7.87E-03	1.10E-01	9.50E-03	8.66E-04	7.48E-05	51.35%
Am-241	14.20	6.31E-02	6.31E-05	1.30E+01	1.50E+01	8.21E-04	9.47E-04	48.65%
TOTAL		7.94E+00	7.94E-03			1.69E-03	1.02E-03	100.00%

Notes:

[a] HNF-2418, Soil Contamination Standards for Protection of Personnel, March 1998, P.D. Rittmann Tables 1 and 4 based on 500 mrem/yr.

[b] WEIGHT OF SOIL X FIELD INSTRUMENT READING X CONVERSION FACTOR.

[c] HNF-3602, Rev 1, Calculating Potential-to-Emit Releases and Doses for FEMPs and NOCs. The Offsite Dose Factor is an annual quantity.

[d] There is no emissions control equipment. Abated and unabated values are equal.

* Source RSR # 221996 (5-28-96) average of values not including Grid B. dpm includes a correction factor of 10. dpm = cpm*correction factor

Appendix D
Calculations for Exhauster Operations

Emissions from C-104 Inventory using Appendix D release fractions

Total Tank Volume	2.59E+05						
Analyte	Inventory Ci	Release Fraction	*Unabated* Release Ci	Cap-88 OffSite MPR mrem/Ci	Offsite *Unabated* Dose mrem/yr	Offsite Abated Dose mrem/yr	Contribution to Dose %
	A	C	D=A*C	E	F=D*E	G=E/2000 (decon. factor) except for gases	H=F/Sum of F
3H	5.61E+01	1.00E+00	5.61E+01	2.50E-05	1.40E-03	1.40E-03	0.00%
14C	1.85E+00	1.00E+00	1.85E+00	1.90E-03	3.52E-03	3.52E-03	0.00%
60Co	2.72E+02	1.00E-03	2.72E-01	3.10E-04	8.43E-05	4.22E-08	0.00%
59Ni	4.58E+00	1.00E-03	4.58E-03	2.50E-01	1.15E-03	5.73E-07	0.00%
63Ni	4.29E+02	1.00E-03	4.29E-01	2.60E-04	1.12E-04	5.58E-08	0.00%
79Se	6.41E+00	1.00E-03	6.41E-03	1.30E-01	8.33E-04	4.17E-07	0.00%
90Sr	4.84E+05	1.00E-03	4.84E+02	1.10E-01	5.32E+01	2.66E-02	23.89%
90Y	4.84E+05	1.00E-03	4.84E+02	3.40E-04	1.65E-01	8.23E-05	0.07%
93mNb	9.90E+00	1.00E-03	9.90E-03	2.10E-03	2.08E-05	1.04E-08	0.00%
93Zr	1.17E+01	1.00E-03	1.17E-02	1.30E-03	1.52E-05	7.61E-09	0.00%
99Tc	5.80E+01	1.00E-03	5.80E-02	2.30E-02	1.33E-03	6.67E-07	0.00%
106Ru	1.81E-04	1.00E+00	1.81E-04	1.60E-02	2.90E-06	2.90E-06	0.00%
113mCd	1.93E+01	1.00E-03	1.93E-02	1.30E-01	2.51E-03	1.25E-06	0.00%
125Sb	1.77E+02	1.00E-03	1.77E-01	2.60E-02	4.60E-03	2.30E-06	0.00%
126Sn	1.72E+00	1.00E-03	1.72E-03	4.70E-02	8.08E-05	4.04E-08	0.00%
129I	7.54E-01	1.00E+00	7.54E-01	2.00E-01	1.51E-01	1.51E-01	0.07%
134Cs	4.50E-02	1.00E-03	4.50E-05	1.00E-01	4.50E-06	2.25E-09	0.00%
137mBa	9.03E+04	1.00E-03	9.03E+01	5.30E-13	4.79E-11	2.39E-14	0.00%
137Cs	9.55E+04	1.00E-03	9.55E+01	2.40E-01	2.29E+01	1.15E-02	10.29%
151Sm	9.40E+03	1.00E-03	9.40E+00	7.50E-04	7.05E-03	3.53E-06	0.00%
152Eu	2.43E+00	1.00E-03	2.43E-03	2.40E-01	5.83E-04	2.92E-07	0.00%
154Eu	1.10E+03	1.00E-03	1.10E+00	2.00E-01	2.20E-01	1.10E-04	0.10%
155Eu	8.05E+02	1.00E-03	8.05E-01	8.00E-03	6.44E-03	3.22E-06	0.00%
226Ra	6.27E-03	1.00E-03	6.27E-06	4.60E-01	2.88E-06	1.44E-09	0.00%
227Ac	1.09E+02	1.00E-03	1.09E-01	1.50E+01	1.64E+00	8.18E-04	0.73%
228Ra	2.26E+01	1.00E-03	2.26E-02	1.90E-01	4.29E-03	2.15E-06	0.00%
229Th	9.41E-01	1.00E-03	9.41E-04	1.60E+01	1.51E-02	7.53E-06	0.01%
231Pa	2.39E+02	1.00E-03	2.39E-01	1.20E+01	2.87E+00	1.43E-03	1.29%
232Th	5.58E+00	1.00E-03	5.58E-03	8.00E+00	4.46E-02	2.23E-05	0.02%
232U	1.93E+01	1.00E-03	1.93E-02	1.10E+01	2.12E-01	1.06E-04	0.10%
233U	4.13E+02	1.00E-03	4.13E-01	3.10E+00	1.28E+00	6.40E-04	0.57%
234U	2.08E+01	1.00E-03	2.08E-02	3.10E+00	6.45E-02	3.22E-05	0.03%
235U	6.03E-01	1.00E-03	6.03E-04	3.00E+00	1.81E-03	9.05E-07	0.00%
236U	6.84E-01	1.00E-03	6.84E-04	2.90E+00	1.98E-03	9.92E-07	0.00%
237Np	4.39E+00	1.00E-03	4.39E-03	1.20E+01	5.27E-02	2.63E-05	0.02%

Calculation for Exhauster Operations (continued)

238Pu	2.27E+02	1.00E-03	2.27E-01	7.60E+00	1.73E+00	8.63E-04	0.77%
238U	1.17E+01	1.00E-03	1.17E-02	2.80E+00	3.28E-02	1.64E-05	0.01%
239Pu	5.47E+03	1.00E-03	5.47E+00	8.20E+00	4.49E+01	2.24E-02	20.13%
240Pu	1.08E+03	1.00E-03	1.08E+00	8.20E+00	8.86E+00	4.43E-03	3.97%
241Am	6.34E+03	1.00E-03	6.34E+00	1.30E+01	8.24E+01	4.12E-02	36.99%
241Pu	1.48E+04	1.00E-03	1.48E+01	1.30E-01	1.92E+00	9.62E-04	0.86%
242Cm	5.38E+00	1.00E-03	5.38E-03	4.10E-01	2.21E-03	1.10E-06	0.00%
242Pu	9.49E-02	1.00E-03	9.49E-05	7.80E+00	7.40E-04	3.70E-07	0.00%
243Am	3.12E-01	1.00E-03	3.12E-04	4.10E-01	1.28E-04	6.40E-08	0.00%
243Cm	4.31E-01	1.00E-03	4.31E-04	8.50E+00	3.66E-03	1.83E-06	0.00%
244Cm	1.50E+01	1.00E-03	1.50E-02	6.70E+00	1.01E-01	5.03E-05	0.05%
	1.19E+06			**Total**	**2.23E+02**	**2.67E-01**	**100.00%**

Appendix E

ALARACT DEMONSTRATIONS USED FOR C-104 RETRIEVAL

ALARACT 1

TANK FARM ALARACT DEMONSTRATION FOR RISER PREPARATION/OPENING

1. **Description of Activity:**

This ALARACT demonstration applies to risers that open directly into tanks containing high-level waste, such as waste storage tanks, catch tanks, double contained receiver tanks and IMUSTs. Other potentially, and known, contaminated risers in Tank Farm facilities shall be accessed using appropriate controls from the HNF-5183, Tank Farms Radiological Control Manual and the latest revision of the Containment Selection Guide, Appendix A, in HNF-IP-0842, Volume VII, Radiological Control, Section 16.7, latest revision.

Risers may have screw caps, blind flanges, shield plugs, or equipment installed in them. Preparation may include the following:

Screw caps: A pre-work survey is completed of the riser and the area around the riser. Soil covering is installed around the riser. If the riser or screw cap is highly contaminated, a glove bag may be installed to control contamination spread. Slight contamination is wiped off the riser with damp rags.

Blind flanges: A pre-work survey is completed of the riser and the immediate work area around the riser, a glove bag may be used to contain the blind flange during removal. Slight contamination is removed with damp rags.

Shield plugs and other equipment to be removed from risers: Risers may have various types of equipment installed. The equipment will be installed and removed per ALARACT 13. To open the riser, it will be necessary to remove the equipment. A pre-work survey is completed of the riser, installed equipment, and the area around the riser. Soil covering is installed around the risers. If necessary, glove bags or sleeving may be used on smaller pieces of equipment to be removed. Larger items may require the need for a windbreak or containment tent.

When the riser is opened, Industrial Hygiene samples may be taken.

All containments used are in accordance with the *Containment Selection Guide, Appendix A,* found in *HNF-IP-0842, Volume VII, Radiological Control Section 16.7*, latest revision.

Soil covering may be of a material such as, plastic sheeting, rubber matting, foil backed paper, griflon, or any material that will prevent possible contamination from reaching the soil.

The riser will be closed after all riser activities are completed.

2. **Radiological Controls:**

- Follow ALARACT demonstration for "Packaging and Transportation of Waste" (ALARACT 4)

- Follow ALARACT demonstration for "Installation, Operation, and Removal of Equipment" (ALARACT 13)

- Pre-job survey is performed

- Use approved *Containment Selection Guide, Appendix A,* from *HNF-IP-0842, Volume VII, Radiological Control, Section 16.7,* latest revision

- Do not open risers if sustained winds are >25 mph. A local wind speed measurement device may be utilized in lieu of Hanford Meteorological Station readings, provided the reading is taken in an unobstructed location that is representative of the work area. Use of a local device and the measured wind speed readings taken from it must be documented in the JCS Work Record.

- Open riser time will be minimized

- HPT coverage will be performed as specified in the Radiological Work Permit

3. **Monitoring:**

- At a minimum, pre and post-job surveys (smears) shall be taken

- Radiological monitoring shall be in accordance with the latest revision of HNF-5183, *Tank Farms Radiological Control Manual*

4. **Records/Documentation:**

- Work Package

- Radiological Work Permit

- Radiological survey report(s)

5. **Emission Pathway:**

- Existing, active or passive point sources

6. **Facility Description:**

- All Tank Farm Facilities

ALARACT 4

TANK FARM ALARACT DEMONSTRATION FOR PACKAGING AND TRANSPORTATION OF WASTE

1. **Description of Activity:**

Some materials become contaminated during work conducted within all Tank Farm facilities. Such contaminated materials, which are not released or otherwise controlled, are handled as radioactive waste. Radioactive waste generated from Tank Farms operations activities such as pit work, excavations, surveillances, housekeeping, maintenance and tank sampling, will be double-contained at a minimum. A radiological survey is conducted prior to storage or transportation of the outer-most container to verify that removable contamination meets the requirements under the Radiological Controls section.

2. **Radiological Controls:**

- Follow ALARACT demonstration for "Size Reduction of Waste Equipment for Disposal" (ALARACT 15)
- Radiological controls shall be in accordance with the latest revision of HNF-5183, *Tank Farms Radiological Control Manual*

3. **Monitoring:**

- At a minimum, pre and post-job surveys (smears) shall be taken
- Radiological monitoring shall be in accordance with the latest revision of HNF-5183, *Tank Farms Radiological Control Manual*

4. **Records/Documentation:**

- Radiological survey report(s)
- Radiological work permit

5. **Emission Pathway:**

- Active or passive, point sources and fugitive sources

6. **Facility Description:**

- All Tank Farm facilities (except special nuclear material in 2718-E)

ALARACT 5

TANK FARM ALARACT DEMONSTRATION FOR SOIL EXCAVATION (USING HAND TOOLS)

1. Description of Activity/Requirements:

Soil is routinely excavated in the Tank Farm facilities to support riser preparation, repair and maintenance activities, soil sampling, cleanup of contamination, removal of vegetation and biological hazards, and operational activities (laying conduit or cables for power). An initial survey is performed of the area to be excavated. Surveys are performed throughout the excavation to assure that worker safety and environmental protection is maintained. Once the excavation begins, water is used, as necessary, to prevent the spread of dust. To the extent practicable using hand held instrument field survey techniques, the clean soil is separated from the soil identified as contaminated. The contaminated soil has a fixative applied or is covered by plastic at the end of the shift, and as necessary, to stabilize the contaminated soil. The activities covered by this ALARACT demonstration do not include D&D. All radioactively contaminated soil excavation is conducted using hand tools.

2. Radiological Controls:

- Follow ALARACT demonstration for "Packaging and Transportation of Waste." (ALARACT 4)
- HPT coverage will be performed as specified in the radiological work permit.
- A beta-gamma survey of the ground surface is required prior to excavation in Contamination Areas (CA's), High Contamination Areas (HCA's), Soil Contamination Areas (SCA's), and Underground Radioactive Material Areas (URMA's). An alpha survey may be required prior to excavation per the "Justification for Dual Survey Exemption in Tank Farm Facilities," HNF-3391.
- For excavation in CA's, HCA's, SCA's, and URMA's, if beta-gamma activity greater than 1000 dpm/probe area (5000 dpm/100cm 2) is identified, alpha surveys will also be performed.
- Suppressants such as water, fixatives, covers, or windscreens will be used as necessary, including at the end of each shift or when sustained or predicted winds are >20mph.
- Excavation of radioactive material shall cease if sustained winds exceed 20 mph. A local wind-speed measurement device may be utilized in lieu of Hanford Meteorological Station readings, provided the reading is taken in an unobstructed location that is representative of the work area. Use of a local device and the measured wind-speed readings taken from it must be documented in the JCS Work Record.
- **If the net contamination for the general area is greater than 200 dpm/probe area alpha or greater than 500,000 dpm/probe area beta-gamma, stop work, notify Environmental and Radcon, and implement the controls listed below. Once**

notifications have been made and the following controls implemented, excavation may continue:

- Soil shall be wetted prior to excavation if not already damp
- General area workplace air monitoring shall be performed during excavation activities
- Excavation and contaminated soil piles will be covered with plastic, or fixative applied at the end of each shift, and/or as necessary to prevent airborne dust particles
- Contaminated soil containing >500,000 dpm per probe area beta-gamma or >200 dpm/probe area alpha will be containerized or covered with clean fill if it is to be left for greater than 48 hours

If soil contamination exceeds 20 mrad/hr (open window reading), work will be stopped, Environmental and Radcon notified, and adequacy of controls will be reassessed. WDOH will be notified. Work may continue when approved by Environmental and Radcon with WDOH concurrence.

If hot specks are detected during the radiological surveys, the specks will be removed and contained before the activity is allowed to continue unless located in the bottom of the trench after excavation has been completed. Specks found in the bottom of the completed trench may be covered with clean fill. A hot speck will be defined as a very small amount (i.e. less than or equal to 100 cm 2) of contamination reading greater than or equal to 1,000,000 dpm/probe size beta-gamma and/or greater than or equal to 490 dpm/probe size alpha.

3. **Monitoring:**

- At a minimum, pre and post-job surveys shall be made
- ***Radiological monitoring shall be in accordance with the latest revision of HNF-5183,*** **Tank Farms Radiological Control Manual**

4. **Records/Documentation:**

- Work package
- Radiological work permit
- Radiological survey report(s)

5. **Emission Pathway:**

- Existing passive (fugitive/diffuse)

6. **Facility Description:**

- All Tank Farm facilities

ALARACT 6

TANK FARM ALARACT DEMONSTRATION FOR PIT ACCESS

This ALARACT demonstration applies to all pits and filter pits which have the potential for exposing tank waste to the pit environment, except 241-ER-152, 241-S-151, 241-UX-154, 241-TX-154, 244-CR Vault DCRT, 244-A Lift Station DCRT, and 244-TX DCRT. Access to these pits must follow the existing Notice of Construction.

If the work activities are such that they can be performed without removal of pit covers, the controls listed in this ALARACT demonstration do not apply. Instead, the work shall be performed using appropriate controls from HNF-5183 "Tank Farms Radiological Control Manual" and the latest revision of the approved Radiological Containment Selection Guide matrix from HNF-IP-0842. Activities which may be conducted in this manner include pit videos/boroscopes, filling seal loops, valve handle change-out, pit wash-downs, fixative application, radiological surveys, remote operation of pit drains, leak detector troubleshooting or changeout, pit drain leak rate tests and removal or insertion of gas sampling lines. Any activity not included in this list must be approved by WDOH on a case-by-case basis.

Pits that do not have the potential for exposing tank waste to the pit environment do not require implementation of ALARACT controls for entry. Examples include flush pits, service pits, annulus pump pits and leak detection pits. These pits shall be accessed using appropriate controls from HNF-5183 "Tank Farms Radiological Control Manual" and the latest revision of the Containment Selection Guide, Appendix A, in HNF-IP-0842, Volume VII, Radiological Control, Section 16.7, latest revision.

1. **Description of Activity/Requirements:**

PREPARATION WORK: A pre-job survey is performed on the exterior surface of the pit and the surrounding area. For pits that are partially or entirely below grade, a fall protection handrail is installed around the pit. The fall protection is draped in plastic sheeting that extends to the top of the pit. This establishes a splashguard around the pit. Before the pit covers are removed, an approved fixative may be applied inside the pit or the pit may be decontaminated as described below. These processes are generally performed through an access port. If there is no access port(s), the pit covers are raised and suspended, a radiological survey is performed, and/or a fixative may be applied inside the pit as described in Section 2, Radiological Control. The pit covers are removed.

DECONTAMINATION: Uniformly distributed removable contamination levels in the pit are decontaminated to less than 100,000 dpm/100 cm 2 beta/gamma and 2,000 dpm/100 cm 2 alpha by washing or an approved fixative is applied to pit surfaces. A fixative will matrix the contamination to ensure minimization of potential airborne contamination. If a high pressure (up to 3,000 psi) or low pressure (approximately 125 psi) whirly is installed, it is done through an opening (if one exists) in the pit covers and the pit is washed down. The pit covers are lifted and contained if the removable level is greater than 50,000 dpm/100 cm 2 beta/gamma and 20 dpm/100 cm 2 alpha. The pit covers are then moved to a storage area. With the pit covers off, additional decontamination activities may include the use of chemicals, peel and strip paints,

water, or manual scrub brushes. When decontamination activities are complete, other work may begin or a temporary cover is installed over the pit.

CLOSURE: After all activities in the pit are completed, the pit covers are reinstalled and the splashguard is removed.

2. **Radiological Controls:**

- Follow ALARACT demonstration for "Riser Preparation/Opening" (ALARACT 1)
- Follow ALARACT demonstration for "Packaging and Transportation of Waste" (ALARACT 4)

Uniformly distributed removable contamination levels within the pit are decontaminated so that a swipe reads less than 100,000 dpm/100 cm 2 beta/gamma and 2,000 dpm/100 cm 2 alpha. Alternatively, a fixative may be applied. An approved fixative will be applied to pit surfaces if contamination levels exceed the limits stated above or as needed. Note: The fixative will matrix the contamination to ensure minimization of potential airborne contamination.

- Swipes will be taken to determine that splash guards are to be maintained below 50,000 dpm/100 cm 2 beta/gamma and 20 dpm/100 cm 2 alpha.
- Use a splashguard extending to the edge of the pit. Splashguard will be taped or sealed to the edge of the pit. If it is not feasible to seal the splashguard to the edge of the pit, an additional rail will be installed at the base of the handrail and the splashguard will be taped or sealed to that bottom rail. This rail will be as close as possible to the pit edge. A ground cover will be placed around the edge of the pit and extending under the bottom rail.
- Pit work will not be performed if sustained winds are >25 mph. A local wind speed measurement device may be utilized in lieu of Hanford Meteorological Station readings, provided the reading is taken in an unobstructed location that is representative of the work area. Use of a local device and the measured wind speed readings taken from it must be documented in the JCS Work Record.
- HPT coverage will be performed as specified in the Radiological Work Permit
- Use approved *Containment Selection Guide, Appendix A, in HNF-IP-0842, Volume VII, Radiological Control, Section 16.7, latest revision.*
- Active ventilation may be utilized in accordance with the PTRAEU NOC.

3. **Monitoring:**

- ***At a minimum, pre and post-job surveys (smears) shall be taken.***
- ***Radiological monitoring shall be in accordance with the latest revision of HNF-5183,* Tank Farms Radiological Control Manual.**

4. **Records/Documentation:**

- Work package
- Radiological work permit
- Radiological survey report(s)

5. **Emission Pathway:**

- Existing passive non-point sources

This ALARACT demonstration applies to all Tank Farm pits except 241-ER-152, 241-S-151, 241-UX-154, 241 TX-154, 244-CR Vault DCRT, 244-A Lift Station DCRT, and 244-TX DCRT.

ALARACT 13

TANK FARM ALARACT DEMONSTRATION FOR INSTALLATION, OPERATION, AND REMOVAL OF TANK EQUIPMENT

1. **Description of Activity/Requirements:**

This ALARACT demonstration does not provide approval for the following activities: waste sampling, sluicing, lancing, operations of mixer pumps, and use of the LDUA. While operating under these activities, the applicable ALARACT demonstrations must be complied with.

A multitude of equipment may be installed, operated, and removed from tanks (actively and passively ventilated).

When installing and removing equipment from tanks, risers and pits are opened. ALARACT 1 (Riser Preparation/Opening) and ALARACT 6 (Pit Access) describe the activities necessary to prepare the risers and pits.

If water lancing is performed to assist in the installation of equipment, it will be done in accordance with ALARACT 10 (Water Lancing).

Equipment is lowered into and removed from tanks either manually or remotely (e.g. using a crane). Once the equipment is installed, mating surfaces of the equipment and riser are sealed.

All equipment removed from tanks is contained using glovebags, sleeving, or other containment devices in accordance with the latest revision of the *Containment Selection Guide, Appendix A, in HNF-IP-0842, Volume VII, Radiological Control, Section 16.7*, latest revision.

The riser is closed under ALARACT 1 (Riser Preparation/Opening) and the pit is closed under ALARACT 6 (Pit Access) following installation or removal of equipment.

Waste is packaged and transported per ALARACT 4 (Packaging and Transportation of Waste). Equipment is packaged and transported per ALARACT 12 (Packaging and Transportation of Equipment and Vehicles).

2. **Radiological Controls:**

- Follow ALARACT demonstration for "Riser Preparation/Opening" (ALARACT 1)
- Follow ALARACT demonstration for "Packaging and Transportation of Waste" (ALARACT 4)
- Follow ALARACT demonstration for "Pit Access" (ALARACT 6)
- Follow ALARACT demonstration for "Water Lancing" (ALARACT 10)

- Follow ALARACT demonstration for "Packaging and Transportation of Equipment and Vehicles" (ALARACT 12)

- Follow ALARACT demonstration for "Size Reduction of Waste Equipment for Disposal" (ALARACT 15)

- Equipment is decontaminated or contained when removed from tanks

- Swipes will be taken to determine that the surface of the item or the outermost surface of the container are maintained <50,000 dpm/100 cm 2 beta/gamma and/or <20 dpm/100 cm 2 alpha

- HPT coverage will be performed as specified in the Radiological Work Permit

- Do not install or remove equipment if sustained winds are >25 mph. A local wind speed measurement device may be utilized in lieu of Hanford Meteorological Station readings, provided the reading is taken in an unobstructed location that is representative of the work area. Use of a local device and the measured wind speed readings taken from it must be documented in the JCS Work Record.

- Use approved *Containment Selection Guide, Appendix A, in HNF-IP-0842, Volume VII, Radiological Control, Section 16.7,* latest revision

3. **Monitoring:**

- At a minimum, pre and post-job surveys (smears) shall be taken

- Radiological monitoring shall be in accordance with the latest revision of HNF-5183, *Tank Farms Radiological Control Manual*

4. **Records/Documentation:**

- Work package

- Radiological work permit

- Radiological survey report(s)

5. **Emission Pathway:**

- Active or passive, point sources and fugitive sources

6. **Facility Description:**

- All Tank Farm facilities

ALARACT 14

TANK FARM ALARACT DEMONSTRATION FOR PIT WORK

This ALARACT demonstration applies to all pits except 241-ER-152, 241-S-151, 241-UX-154, 241-TX-154, 244-CR Vault DCRT, 244-A Lift Station DCRT, and 244-TX DCRT.

1. Description of Activity/Requirements:

When entering or exiting the pit, ALARACT 6 "Pit Access" must be complied with.

All equipment removed from the pit is decontaminated or contained. A temporary or permanent cover is placed over the pit if ever left unattended.

Installing pit leak detectors, unplugging drains, and housekeeping/waste removal activities are performed following the above description.

Specific activities performed in pits follows:

(NOTE: The "Pit Viper" may be used for any of the following activities as long as the appropriate controls, identified below, are implemented.)

Jumper Work

Before any jumper work takes place, the affected lines are flushed (if possible) and an approved fixative is applied. The fixative will be applied in accordance with ALARACT 6 "Pit Access" and reapplied as necessary.

Swipes of the splash guard will be taken during the jumper work. If a used jumper is to be removed from the pit, it is drained and a fixative is applied. If removable contamination is greater than 50,000 dpm/100 cm 2 beta/gamma and/or 20 dpm/100 cm 2 alpha, the jumper will be contained and/or decontaminated.

If jumpers are cut, they are cut by hydraulic shears or a portable band saw within the pit. The pieces are contained before they are removed from the pit.

Pressure Testing Lines

A pressure test assembly is installed on the line to be tested in one pit. A blank with a drain is installed on the other end of the line in a separate pit. Temporary and/or permanent covers are placed over the pits during the pressure test.

2. Radiological Controls:

- Follow ALARACT demonstration for "Riser Preparation/Opening" (ALARACT 1)
- Follow ALARACT demonstration for "Packaging and Transportation of Waste"

(ALARACT 4)

- Follow ALARACT demonstration for "Pit Access" (ALARACT 6)

- Follow ALARACT demonstration for "Packaging and Transportation of Equipment and Vehicles" (ALARACT 12)

- A splashguard will extend to the edge of the pit where it is taped or sealed. If it is not feasible to seal the splashguard to the edge of the pit, an additional rail will be installed at the base of the handrail and the splashguard will be taped or sealed to that bottom rail. This rail will be as close as possible to the pit edge. A ground cover will be placed around the edge of the pit and extending under the bottom rail.

- Swipes will be taken to determine that splash guards are maintained below 50,000 dpm/100 cm 2 beta/gamma and 20 dpm/100 cm 2 alpha

- Uniformly distributed removable contamination levels within the pit are decontaminated so that a swipe reads less than 100,000 dpm/100 cm 2 beta/gamma and 2,000 dpm/100 cm 2 alpha. An approved fixative will be applied to pit surfaces if contamination levels exceed the limits stated above or as needed. Note: The fixative will matrix the contamination to ensure minimization of potential airborne contamination.

- If a used jumper is to be removed from the pit, it is drained and a fixative is applied. If removable contamination is greater than 50,000 dpm/100 cm 2 beta/gamma and/or 20 dpm/100 cm 2 alpha, the jumper will be contained and/or decontaminated.

- A temporary or permanent cover is placed over the pit if the pit is ever left unattended

- Pit work will not be performed if sustained winds are >25 mph. A local wind speed measurement device may be utilized in lieu of Hanford Meteorological Station readings, provided the reading is taken in an unobstructed location that is representative of the work area. Use of a local device and the measured wind speed readings taken from it must be documented in the JCS Work Record.

- HPT coverage will be performed as specified in the Radiological Work Permit

3. **Monitoring:**

- At a minimum, pre and post-job surveys (smears) shall be taken

- ***Radiological monitoring shall be in accordance with the latest revision of HNF-5183,*** **Tank Farms Radiological Control Manual**

4. **Records/Documentation:**

- Work package

- Radiological work permit

- Radiological survey report(s)

5. **Emission Pathway:**

- Existing passive non-point sources

6. **Locations:**

This ALARACT demonstration applies to all Tank Farm pits except 241-ER-152, 241-S-151, 241-UX-154, 241-TX-154, 244-CR Vault DCRT, 244-A Lift Station DCRT, and 244-TX DCRT.

ALARACT 15

TANK FARM ALARACT DEMONSTRATION FOR SIZE REDUCTION OF WASTE EQUIPMENT FOR DISPOSAL

1. Description of Activity/Requirements:

Size reducing, cutting or disassembling contaminated material and equipment is done for more economical waste packaging. Containment devices are employed as applicable per the Containment Selection Guide, Appendix A, in HNF-IP-0842, Volume VII, Radiological Control, Section 16.7, latest revision. The process is limited to mechanical cutting techniques such as low speed and high speed sawing, snipping, shearing, as well as hot work such as cutting torches. The process will also include bending, crimping, and compaction to preclude the need for cutting operations.

Examples of items cut up or disassembled for waste disposal during facility operations include long-length contaminated equipment (i.e. waste tank level instrumentation, thermocouple trees, specific gravity probes, observation ports, hose and piping), waste sampling equipment (i.e. drill strings or augers), pumps, compressors, and deactivated exhausters with associated ductwork. This includes replacement and disposal of flexible ventilation ductwork located upstream of HEPA filtration.

2. Radiological Controls:

- Follow ALARACT demonstration for "Packaging and Transportation of Waste" (ALARACT 4)
- Equipment with removable contamination will be contained per the *Containment Selection Guide, Appendix A, in HNF-IP 0842, Volume VII, Radiological Control, Section 16.7*, latest revision, or decontaminated
- HPT coverage as specified in the Radiological Work Permit

3. Monitoring:

- At a minimum, pre and post-job surveys (smears) shall be taken
- Radiological monitoring shall be in accordance with the latest revision of HNF-5183, *Tank Farms Radiological Control Manual*

4. Records/Documentation:

- Radiological work permit
- Radiological survey report(s)

5. **Emission Pathway:**

- Active or passive, point sources and fugitive sources

6. **Facility Description:**

- All Tank Farm Facilities

ALARACT 16

TANK FARM ALARACT DEMONSTRATION FOR WORK ON POTENTIALLY CONTAMINATED VENTILATION SYSTEM COMPONENTS

1. **Description of Activity/Requirements:**

Scope will include work on potentially contaminated ventilation system components. This may include repair or replacement of ductwork, dampers, valves, recirculation fans, flexible boots, heaters, instrumentation, or other ventilation system components.

The process will be performed using mechanical techniques such as unbolting, drilling, snipping, shearing, cutting, abrading, or low and high speed sawing, as well as hot work such as cutting torches. Other activities may include installation of instrumentation, test ports, or sample ports. Containment devices are employed as applicable per the *Containment Selection Guide, Appendix A*, in HNF-IP-0842, Volume VII, Radiological Control, Section 16.7, latest revision.

If exhaust systems are replaced under the "replacement-in-kind" provisions of WAC 246-247 utilizing this ALARACT demonstration, then the abatement controls of the new system must be equivalent or better than those of the system that is replaced. The operational flowrate of the new system may not exceed that of the replaced system.

2. **Radiological Controls:**

Follow ALARACT demonstration for "Packaging and Transportation of Waste" (ALARACT 4)

Work with removable contamination will be contained per the latest revision of the *Containment Selection Guide, Appendix A*, in HNF-IP-0842, Volume VII, Radiological Control, Section 16.7, latest revision.

HPT coverage as specified in the Radiological Work Permit

3. **Monitoring:**

At a minimum, pre and post-job survey (smears) shall be taken

Radiological monitoring shall be in accordance with the latest revision of HNF-5183, *Tank Farms Radiological Control Manual*

4. **Records/Documentation:**

Radiological work permit

Radiological survey report(s)

5. **Emission Pathway:**

Active and passive, point sources and fugitive sources

6. **Tank Farm Facility Description:**

All Tank Farm Facilities

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Attachment 2
03-ED-031

Hanford Site Title V Air Operating Permit
"Notification of Off-Permit Change Request" Form

HANFORD SITE AIR OPERATING PERMIT

Notification of Off-Permit Change

Permit Number: 00-05-006

This notification is provided to Washington State Department of Ecology, Washington State Department of Health, and the U.S. Environmental Protection Agency as notice of an off-permit change described as follows.

This change is allowed pursuant to WAC 173-401-724(1) as: **1. Change is not specifically addressed or prohibited by the permit terms and conditions** **2. Change does not weaken the enforceability of the existing permit conditions** **3. Change is not a Title I modification or a change subject to the acid rain requirements under Title IV of the FCAA** **4. Change meets all applicable requirements and does not violate an existing permit term or condition** **5. Change has complied with applicable preconstruction review requirements established pursuant to RCW 70.94.152.**

Provide the following information pursuant to WAC-173-401-724(3):

Description of the change:
An application for "Approval of Radioactive Air Emissions Notice of Construction (NOC) for Installation and Operation of Waste retrieval Systems in Single Shell Tank (SST) 241-C-104" was submitted for the installation and operation of a waste retrieval system.
Date of Change: (To be provided in the agency approval order.)
The date the approval order is issued by Washington State Department of Health.
Describe the emissions resulting from the change:
Radioactive air emissions unabated doses are X mrem per year total effective dose equivalent to the maximally exposed individual for the waste retrieval system setup and operation. Radioactive air emissions abated doses are X mrem per year.
Describe the new applicable requirements that will apply as a result of the change: (To be provided in the agency approval order.)
Conditions and limitations will be those identified in the approved order when issued by Washington State Department of Health.
For Hanford Use Only:

AOP Change Control Number:	Date Submitted: